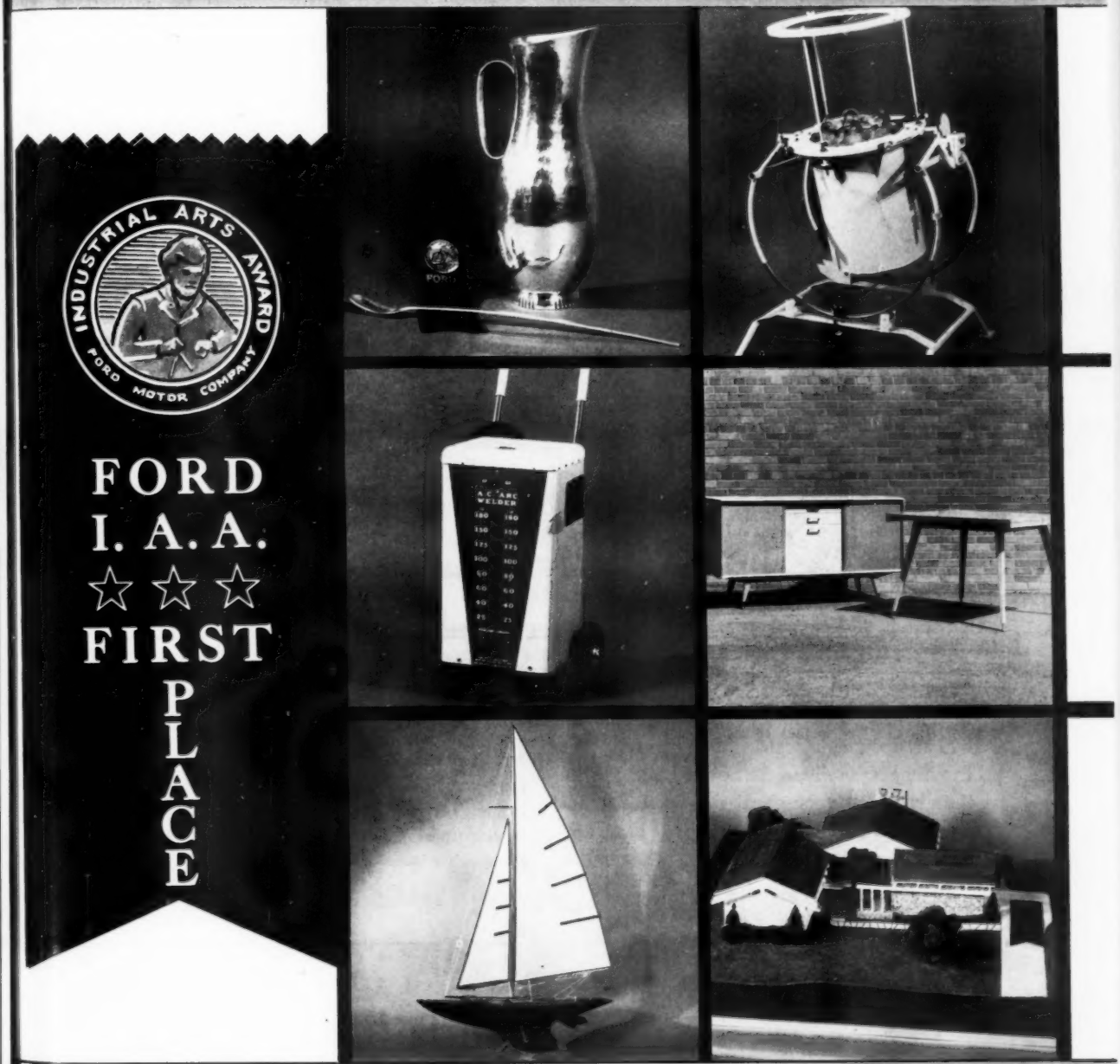
EDUCATION
SEPTEMBER, 1960

american VOCATIONAL journal

Salute to Industrial Arts



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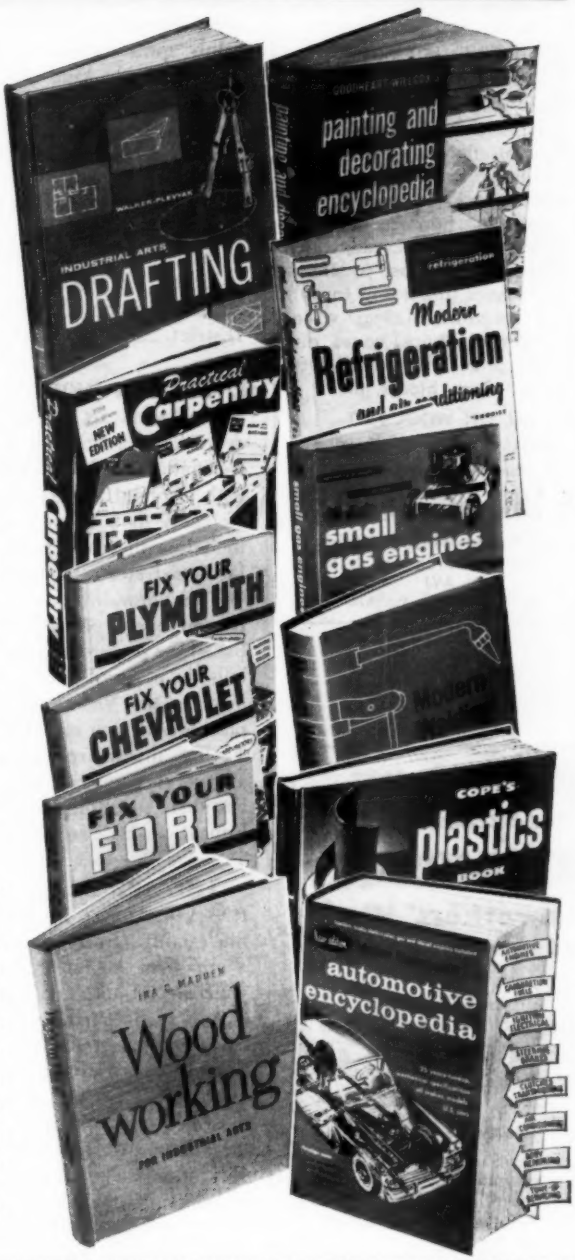

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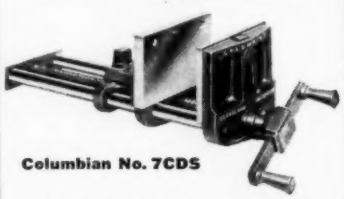

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comment

I WISH to extend my compliments on the very fine May issue. *Congress Speaks Up for Vo-Ed* was certainly quite interesting and informative and is the kind of material which needs to be widely read by all members and also potential members.

The detailed testimony gives all members an opportunity for evaluating many of the problems and attitudes of persons who are in a position to have a rather direct effect on the program. —LIONEL E. CROSS, Supervisor of Agriculture, San Jose United School District, San Jose, Calif.

—AVA—

The WONDERFUL April issue of the AMERICAN VOCATIONAL JOURNAL devoted to a "Salute to Industry" is tremendously interesting and filled with wonderful, wonderful articles. Not only that, but it is very attractive including the cover with the good old fashioned steam whistle.

You know, of course, that we are tremendously pleased that you published the picture and the article which tells the story of the float made by the boys in the Vocational School. I am pleased and you may be sure that Mr. Taylor, the instructors and the boys are very, very grateful.—HAROLD M. OSTREM, Director, Vocational & Adult Education, St. Paul, Minn.

—AVA—

THE APRIL issue of the AMERICAN VOCATIONAL JOURNAL is the usual fine quality. I usually read your *Latest Word from Washington* first. I noted your special note to Vo-Ag teachers.

As I read your answer to the Vo-Ag teacher my first thought was that you should have advised that he quit teaching. If he was not well enough informed or up-to-date enough to know the future of Ag Education he probably wasn't up-to-date enough to do an effective jób of teaching farm boys or adults and should quit attempting to be a Vo-Ag teacher. If he was so influenced by the critics of agriculture that he doubted the future of agriculture education he is a weak booster for ag. His job is to lead others, not to be a follower of the uninformed.

On second thought possibly this teacher may develop more faith in his work and actually promote Ag Education so your answer was the right one.

TWO 1960 MODELS

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This new 3d edition contains a new chapter on transistors. It has a new tube chart. It uses many new illustrations to emphasize visual teaching. It provides new text material to keep abreast of all recent developments.

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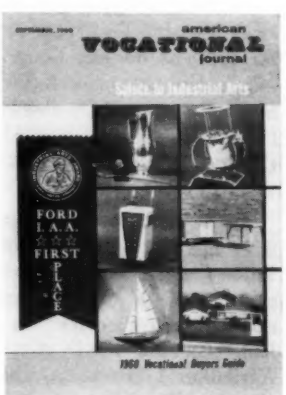

THE COVER: Winning Industrial Arts Awards this year included a sterling silver pitcher, Lee Jones, D. C.; a solar energy power plant, David Bromling, Everett, Wash.; an AC arc welder, Roger E. Neafus, West St. Paul, Minn.; a maple dining room set, John Chuckran, Brockton, Mass.

Also a 36" model racing yacht. Wayne Sasabe, Los Angeles, Cal.; and a model beach home, James Cary, Altadena, Cal. Congratulations boys!

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(Offer not available to students nor to subscribers outside the U.S.A.)

Thank you for your good job of representing all of the vocational educators in Washington. — JAMES E. HAMILTON, Vice President, Region III, NVATA

—A V A—

CONGRATULATIONS on the May issue of the JOURNAL. I join with a number of enthusiastic readers whom I have heard express a great deal of appreciation for this month's JOURNAL, the varied topics of interest and of course, one of our prime concerns and interests, the article on *Don't Forget the Girls*. The coverage given to the hearings for vocational education is, as you put it, a "must" reading for all of us.—GEORGE L. BRANDON, Associate Professor, Michigan State University.

—A V A—

WE IN the Bureau of Apprenticeship and Training certainly appreciate the space and display you gave to our April article on *Manpower in the 1960's*.—MARGARET M. TROXELL, Technical Services, Bureau of Apprenticeship and Training, U. S. Department of Labor.

—A V A—

I HAVE been quite impressed with the tremendous improvement in the layout for the entire JOURNAL.—JAMES R. D. EDDY, Dean, University of Texas Division of Extension.

—A V A—

I KNOW of no issue of the JOURNAL that I have received over the past 25 years that did not give me some new ideas and help me find out about what others are doing without some profit to me.—GEORGE MORGENROTH, Director, Essex County Vocational and Technical Schools, Newark 2, N. J.

—A V A—

THE APRIL issue is the finest I have ever read. The articles by James Eddy, Margaret Troxell, Abner Hathaway and Joe Bail truly set the stage for the next decade. Congratulations! —J. E. HOLLINGSWORTH, former Dean, Business and Technology Division, Long Beach City College, Long Beach, Calif.

—A V A—

I AM especially pleased with the general make up of the JOURNAL and I like the use of color as well as the generous use of good, clear photos. The articles and other features are excellent.—GEORGE P. DEYOE, Professor, Agricultural Education, University of Illinois, Urbana.

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Latest Word from Washington

AS THE NEW SCHOOL YEAR BEGINS we are happy to greet you with a magazine of fine features that call for your special attention.

This issue features the annual vocational buyers guide. Be sure to keep this invaluable purchasing aid on hand throughout the school year for quick reference.

Other features in this issue are in special tribute to our nation's program of industrial arts. Industrial arts leaders in AVA have spent a great deal of time and careful thought in collecting this material for publication and we commend them for a job well done.

COMING UP. The JOURNAL staff and Editorial Board have many excellent issues of the magazine lined up for publication this fall and winter. As your busy schedules begin and another year progresses, we hope you will look for your JOURNAL monthly. Your constructive criticism and your suggestions are welcome at all times.

LEGISLATION. Final action on vocational appropriations for fiscal 1961 will be completed before the 86th Congress adjourns. Both the House and Senate approved identical amounts for vocational education, including the full amounts authorized for agriculture, home economics, trades and industry and distributive occupations; $4 million for practical nurse training; $180,000 for the fishery trades; and $9 million for area vocational programs. The latter is an increase of $2 million over the previous year. Since there is no disagreement between the House and Senate as to the amount for vocational education, we are quite sure the amounts mentioned above will be approved.

The practical nurse measure (S. 3025 and H.R. 11893) has been approved by the Senate without a dissenting vote and by the House Education and Labor Committee with no opposition. As we go to press the measure is pending before the House Rules Committee. It is our hope before the present Congress adjourns that final action will be taken on this measure authorizing appropriations for practical nurse training for four more years.

Congress approved the depressed area measure, which carried an authorization of $1.5 million annually for vocational training of unemployed workers in depressed areas; but the measure was vetoed by the President.

PLATFORMS. AVA representatives appeared before the platform committees of both the national political parties -- Democratic and Republican. State Vocational Directors -- A. E. Robinson, Louisiana; Mark Nichols, Utah; and A. R. Bunger, Colorado -- presented statements at advance hearings conducted by Democratic Platform Panels at St. Louis, Salt Lake City and Denver. C. L. Greiber, State Director for Wisconsin appeared before the Republican Platform Committee in Chicago. These witnesses presented the case for vocational education in an excellent manner. Other vocational leaders throughout the nation helped materially with this important matter.

Planks in the platforms of national political parties are of tremendous value in securing and maintaining support for vocational appropriations and legislation.

VOCATIONAL EDUCATION HAS PLANKS IN BOTH PARTY PLATFORMS

Without strong planks in political party platforms your AVA leaders have little to stand on in their effort to maintain federal appropriations at present levels and to secure additional favorable legislation.

We are glad to present in this column the exact language of vocational planks that were adopted as a part of National Platforms by both the Democrats and Republicans. The statements are not presented out of context or in such manner that they would result in misleading intent.

The Democratic Platform. The following planks appear in the National Democratic Platform:

Under the heading "EDUCATION" --

> "We pledge further federal support for all phases of vocational education for youth and adults..."

Under the heading "PLANNING FOR AUTOMATION" --

> "...For the young and the technologically displaced workers, we will provide the opportunity for training and retraining that equips them for jobs to be filled..."

Under the heading "IMPROVING WORKING AND LIVING ON FARMS" --

> "...We will help people help themselves with extended and supervised credit for farm improvement, local industrial development, improved vocational training and other assistance to those wishing to change to non-farm employment..."

Under the heading "AID TO DEPRESSED AREAS" there appears a pledge that legislation similar to that passed twice by the national Congress and twice vetoed by President Eisenhower, which included $1.5 million for vocational training, will be made law.

The Republican Platform. The following statements appear in the National Republican Platform:

Under the heading "EDUCATION" --

> "Toward the goal of fullest possible educational opportunity for every American, we pledge these actions:...
>
> "Stimulation of actions designed to update and strengthen vocational education for both youth and adults."

Under the heading "AGRICULTURE" --

> "To assure steady balanced growth and agricultural progress, we pledge:
>
> "Expansion of the Rural Development Program to help low-income farm families not only through better farming methods, but also through opportunities for vocational training, more effective employment services, and creation of job opportunities through encouragement of local industrialization."
>
> "Strengthening of the educational programs of the U.S. Department of Agriculture and the Land-Grant institutions."

Under the heading "LABOR" --

> "Continued improvement of manpower skills and training to meet a new era of challenges, including action programs to aid older workers, women, youth, and the physically handicapped."
>
> "Encouragement of training programs by labor, industry and government to aid in finding new jobs for persons dislocated by automation or other economic changes."

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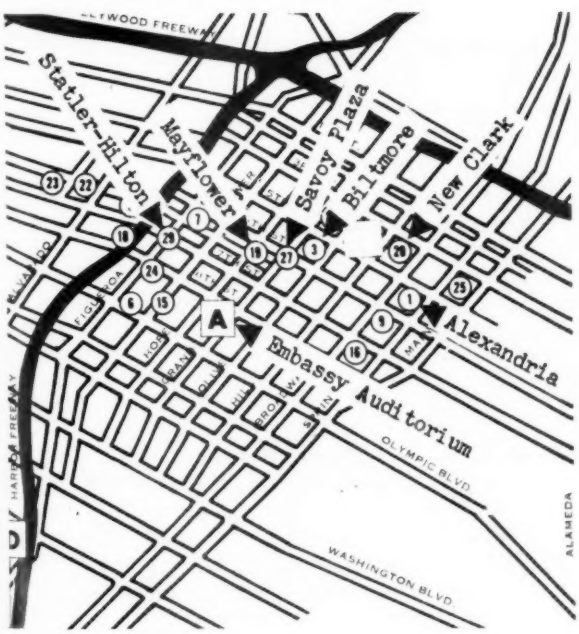

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WATCH FOR "THE TRUTH ABOUT SOVIET EDUCATION" IN OCTOBER

FEDERAL SUPPORT FOR GENERAL EDUCATION. The following are excerpts from the Democratic Platform dealing with federal support for general education:

"America's teachers, parents and school administrators have striven courageously to keep up with the increased challenge of education.

"So have states and local communities. Education absorbs two-fifths of all their revenue. With limited resources, private educational institutions have shouldered their share of the burden.

"Only the Federal Government is not doing its part. For eight years, measures for the relief of the educational crisis have been held up by the cynical maneuvers of the Republican Party in Congress and the White House.

"We believe that America can meet its educational obligations only with generous Federal financial support, within the traditional framework of local control. The assistance will take the form of Federal grants to states for educational purposes they deem most pressing, including classroom construction and teacher's salaries. It will include aid for the construction of academic facilities as well as dormitories at colleges and universities."

The following are excerpts from the Republican Platform dealing with federal support for general education:

"We are aware of the fact that there is a temporary shortage of classrooms for our elementary and secondary schools in a limited number of states. But this shortage, due to the vigilant action of state legislatures and local school boards, is not increasing, but is decreasing.

"We shall use our full efforts in all the states of the Union to have these legislatures and school boards augment their present efforts to the end that this temporary shortage may be eliminated and that every child in this country shall have the opportunity to obtain a good education. The respective states as a permanent program can shoulder this long-standing and cherished responsibility easier than can the federal government with its heavy indebtedness.

"We believe moreover that any large plan of federal aid to education, such as direct contributions to or grants for teachers salaries can only lead ultimately to federal domination and control of our schools to which we are unalterably opposed."

THE TRUTH ABOUT SOVIET EDUCATION. This is the title of a story that appeared in the July 4 issue of the magazine U.S. NEWS AND WORLD REPORT. It was an interview story in which AVA representatives H. H. London, Missouri and Mark Nichols, Utah, told of their trip to Russia during the latter part of April and the first part of May. This is must reading for all AVA members. The story in full will be reproduced in the October issue of the AMERICAN VOCATIONAL JOURNAL.

M. D. Mobley

M. D. Mobley, Editor-in-Chief
and AVA Executive Secretary

From the Public Information Committee

California Industrial Educators Act. The Executive Council of the California Industrial Education Association has indicated its desire to work with the AVA Committee on Public Information. The Southern Section of CIAE has appointed Wally Randleman of Upland, California, chairman of its public information committee.

Georgia's Governor's Conference on Education Reports on Vocational Education. An attractive 44-page publication issued by the Governor's Conference on Education provides an excellent overview for the lay public of the extent and the accomplishments of vocational and technical education in Georgia. It provides information that should be available to the public in every state and illustrates good ways of presenting this information. It is available from the State Department of Education, Atlanta.

What is a "Tough" School? Ammunition is provided for those who do not believe that mathematics, science, and foreign languages are the only tough subjects or that toughness in itself is an end to be sought in an article by Gerald T. Kowitz in the *American School Board Journal* for April, 1960: "The Requirements of a Tough School." What would be tougher, or more useless, for many academically minded students than some of our rigorous vocational and technical courses? Should toughness and utility be separated also in our thinking about non-vocational courses? Can a course be tougher than the students who come into it? Some new thinking regarding these questions on the part of lay and professional people seems to be in order.

New Technical School Described in School Board Journal. Two pages were given to the new Bucks County Technical School, located on the northeast boundary of Philadelphia, in the April 1960 issue of the *American School Board Journal.* Are there other new vocational and technical schools whose programs and facilities could be reported in general publications? Reporting the heavy investments some communities are making in new schools of these types indicates long-term commitments to vocational and technical education by these communities, reassuring communities where public opinion is wavering.

School Shop Stirs Interest in Public Relations. The magazine, *School Shop,* which is widely read by industrial educators, made its April 1960 issue a special on *Public Relations for Industrial Educators.* There were 12 articles, covering 36 pages, which deal with many aspects of public relations.

Distributive Educators Alert to Need for Public Information. Leaders in distributive education have recently provided new evidence of their aggressiveness in providing public information. An attractive 140-page publication, *Effective DE Practices* leads off with 41 pages on the promotion of the program, detailing promotional devices that have been used successfully. The Tulsa Public

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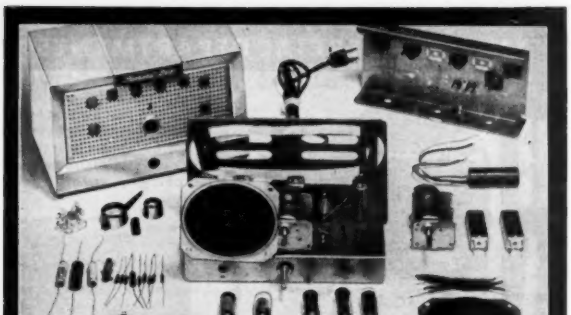

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Schools, have produced a six-page folder, *Facts About Distributive Education*. The Central Region Conference of Distributive Educators at Indianapolis opened on May 1 with a half-day devoted to public information. A small brochure on distributive education, one of the AVA Public Information Series, is now off press.

One TV Series Leads to Another. With the completion of 12 TV programs on vocational education, Indiana launched a new summer series of eight half-hour programs. They were carried by an Indianapolis station and made available on kineoscope to 13 other stations in the state. A series of 15-minute radio programs on guidance is projected for the fall.

Dr. Conant Completes the Picture. Those who have been reading and quoting Dr. James B. Conant on the education of the 15 to 20 percent who are academically talented should have their attention called to his article in the *Ladies Home Journal* for May 1960, *Public Concern for All American Youth*. In it he states his case for vocational education for a large part of the high school population. Copies are available from AVA headquarters at $1 per hundred.

Mid-Year Meeting on Public Information. Four members of the Public Information Committee met with Gilbert Weaver, Chairman of the AVA Publications Committee at AVA headquarters in July to discuss strategy for the remaining of the year.

Public Evaluation as a Means of Providing Public Information. One of the best means of getting information to the public regarding vocational and practical arts education is through a survey or evaluating committee of representative citizens, aided by professional consultants. In this way the strengths and weaknesses of a program are brought to the attention of an influential group, which should have channels to the board of education. The limitations under which those work who are responsible for the program are also brought out and the need for funds and facilities is made clear. Reports to the public of such a group can be very influential in shaping public opinion. Periodic evaluation on behalf of the public should be a part of every program of vocational and practical arts education.—H. M. HAMLIN, *Chairman*

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FROM THE U. S. OFFICE

Members of the Agricultural Education Branch worked with the national Boards of Student Officers and Directors of the Future Farmers of America July 25-29, and the national Board of Trustees and Advisory Council of the New Farmers of America August 8-12. The principal work of both groups involved planning for their respective national conventions. The FFA convention will be held in Kansas City, Missouri, October 11-14, and the NFA convention will be in Atlanta, Georgia, October 3-6.

—AVA—

After a long and distinguished career in the field of vocational education, Edward G. Ludtke, Program Specialist, Trade and Industrial Education Branch, retired from the U. S. Office of Education on July 22.

Mr. Ludtke is a recognized leader in the field of trade and industrial education. His wide experience as a vocational educator, his knowledge of sound administrative principles and practices, and his keen understanding of the elements that build good instructional programs gained the respect and admiration of his colleagues in the states and in the Office of Education. One of Mr. Ludtke's special responsibilities in the past few years was assisting the states to develop programs of training for the fishery trades and industry. He completed the manuscript for a bulletin on this area of training before retiring.

—AVA—

Beulah I. Coon, Research Specialist, and Berenice Mallory, Assistant Director, Home Economics Education Branch, served as consultants at the meeting of the Steering Committee of College Teachers of Foods and Nutrition held in Boulder, Colorado, June 24-27. The group evaluated the progress made during the past year by the regional groups of college teachers of foods and nutrition and made plans for the years ahead. Mary Lee Hurt, Specialist in Curriculum Studies, Home Economics Education Branch, was consultant for a similar group, the Steering Committee of College Teachers of Textiles and Clothing. They met in Denver, Colorado, June 25-26, where their main task was to develop plans for a coordinated program of meetings and other activities for the years ahead.

—AVA—

John A. Beaumont, Director, and Program Specialist, Distributive Education Branch, participated in the annual meeting of the National Association of Direct Selling Companies in New York City, June 13. Mr. Beaumont addressed the group on *Direct Selling in the Distributive Education Program* and emphasized the economic implications of the program goals. Mr. Sanders prepared and manned a display of educational and promotional material.

—AVA—

Pilot centers are being set up in the States of Pennsylvania, Virginia, and West Virginia for the purpose of determining if it is feasible to coordinate the instruction in farm mechanics and agricultural science. Two departments of vocational agriculture in each of the three states have been selected for this purpose. The study will be carried on for one or more years. Those who will be

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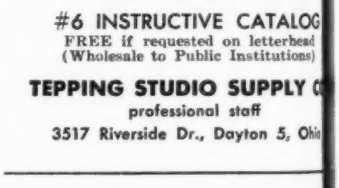

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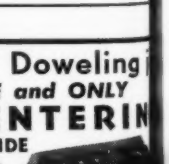

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involved in the study are: teachers of vocational agriculture, superintendents and principals of schools, and supervisors of vocational agriculture. During the summer, A. H. Hollenberg, R. E. Naugher, and Duane M. Nielsen of the Agricultural Education Branch assisted in the planning of the pilot centers, and will participate in evaluation of the program.

—AVA—

Lynn A. Emerson who has served during the last two years as Consultant, Area Vocational Education Branch, is now engaged in private consultative work in technical education for several State Departments of Education. Dr. Emerson was called upon by the Division of Vocational Education in 1958 to help set up the Area Vocational Education Branch for the administration of Title VIII of the National Defense Education Act of 1958.

—AVA—

Mildred Reel, Assistant National Adviser, Future Homemakers of America, served as a resource person for a FHA Workshop held at Washington State University in Pullman from July 25 to August 5. During the two-week session, the homemaking teacher participants worked on ways to assure that the Future Homemakers of America is an integral part of the homemaking program, and ways to use the national program of work to build better chapters.

—AVA—

Donovan Armstrong, Program Specialist, Distributive Education Branch, addressed the annual distributive education conference in Georgia on the topic *New Concepts and Trends in Distributive Education.* Held at St. Simons Island, August 1-5, the conference was attended by state and local distributive education personnel and the staff of the secondary school division of the State Department of Education.

—AVA—

James H. Pearson, Assistant Commissioner for Vocational Education, Walter M. Arnold, Director, and Frank J. Coyle, Program Specialist, Area Vocational Education Branch, in company with other officials of the U. S. Office of Education reviewed the training program and the facilities of the Federal Aviation Research Center in Oklahoma City in July. The center offers advanced training in aviation communications and navigation to qualified electronic technicians interested in career opportunities in the Federal Aviation Agency. The FAA estimates that over 2,000 electronic technicians will be needed annually for the next five years to help man the nation's airways and looks hopefully to vocational education to assist in meeting this need.

—AVA—

Ata Lee, Program Specialist, and Berenice Mallory, Assistant Director, Home

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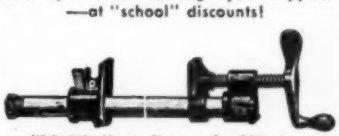

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Economics Education Branch, were in charge of a conference for city supervisors of home economics held at the Georgia Center for Continuing Education, University of Georgia, Athens, July 18-23. The meeting was co-sponsored by the College of Education, University of Georgia, the Division of Home Economics Education of the State Department of Education in cooperation with the Home Economics Education Branch of the Office of Education.

—AVA—

A series of seven Intra-Regional Conferences on Curriculum Development in Practical Nurse Education, sponsored by the U. S. Office of Education in cooperation with the National League for Nursing, was completed on June 4. Over 300 persons concerned with practical nurse education from 47 States and the Territories participated in these meetings. Analysis of nursing situations used for practical nurse training was recognized as an effective tool in identifying curriculum content and in selecting appropriate educational experiences for practical nurse students. Work group accomplishments stimulated many conferees to initiate plans for continuing these activities as one method of improving their programs of instruction. Helen K. Powers, Program Specialist, Practical Nurse Education, Trade and Industrial Education Branch, served as coordinator for this series of conferences.

—AVA—

Sam W. King, Program Specialist, Trade and Industrial Education Branch, served as conference leader during the Leadership Development Conference held at Highlands University, Las Vegas, New Mexico, June 6-17. The conference was sponsored by the trade and industrial education division of the New Mexico State Department of Education and was attended by 30 trade and industrial teachers and supervisors.

—AVA—

Edna P. Amidon, Director, Berenice Mallory, Assistant Director, and Alberta Hill, Program Specialist, Home Economics Education Branch, were all active participants in the Annual Meeting of the American Home Economics Association held in Denver, June 27-July 1, 1960. Miss Amidon spoke at the second general session on *New Directions in Home Economics Education*, Dr. Mallory was responsible for an orientation session for international guests participating in the meeting, and Dr. Hill was on the program of the Colleges and Universities Section.

—AVA—

The June issue of "Office Executive" published by the National Office Management Association, featured an article, *Education for Office Careers*, written by Bruce I. Blackstone, Specialist, Office Education, Vocational Division, USOE.

—AVA—

Now being proposed is a report of a National Conference on Office Education, sponsored by the Vocational Division, that was held in the Office of Education, May 9-13, 1960. The purpose of this conference was to develop "Guides for Action" to be considered in establishing or evaluating Office Education programs. Commissioner L. G. Derthick invited 20 conferees recommended by professional organizations of business education to attend this meeting. Bruce I. Blackstone, Specialist, Office Education, who conducted the conference, was assisted by William Selden, Consultant, Business Education, Pennsylvania Department of Instruction, on special assignment with the U. S. Office of Education. Assistant Commissioner James H. Pearson, participated in the conference.

—AVA—

Mary Marks, Program Specialist, Distributive Education Branch, conducted workshop sessions on leadership responsibilities at the annual Oklahoma Coordinator's Conference. Held at Oklahoma State University, Stillwater, June 6-10, the group considered ways to meet enlarged responsibilities in the next 5 years.

"Looking to the 60's for Leadership and Progress" was the subject of an address presented by Harold J. Rosengren, Program Specialist, Trade and Industrial Education Branch during the Indiana Leadership Development Conference for Trade and Industrial Education, June 13-17 at Purdue University.

—AVA—

Home—the Hub of Good Citizenship was the theme of the 1960 National Meetings of Future Homemakers of America and New Homemakers of America, Secretary of Health, Education, and Welfare Arthur S. Flemming was a keynote speaker for the FHA meeting held at the Statler Hilton in Washington, D. C.

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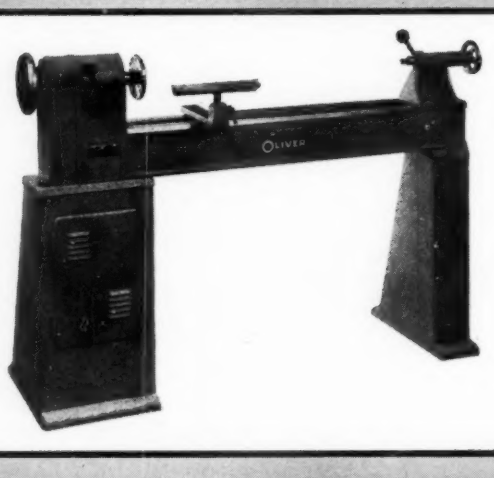

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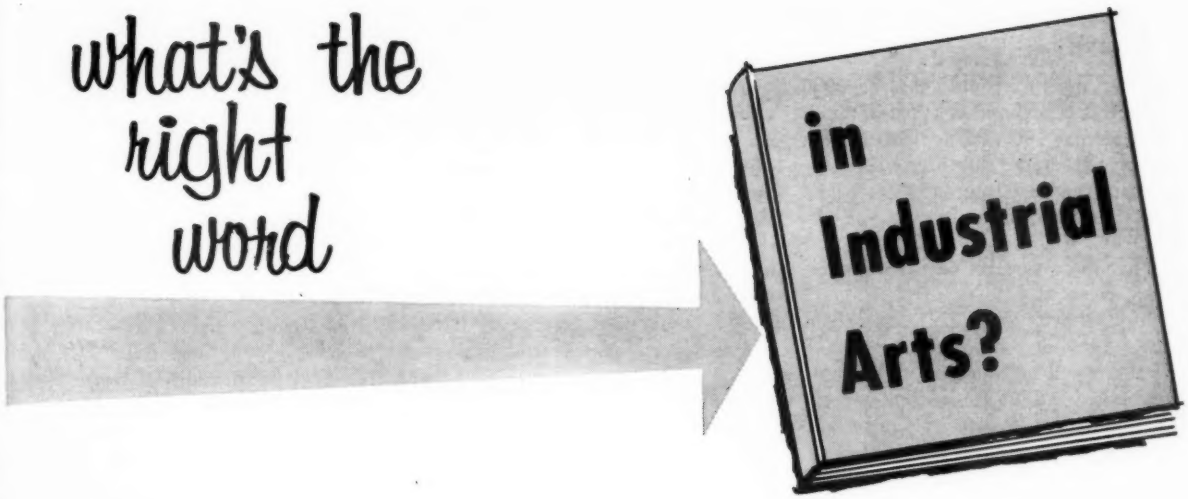

By Henry S. Thomassen

WE MUST TEACH TECHNICAL VOCABULARY! More properly, we must emphasize the importance of technical vocabulary and we must remove the fear of technical words. We must give the student command of a basic technical vocabulary, show him how to build his technical word list—with words he knows, understands, and uses correctly—and most of all, help him gain the skill and competence to proceed further.

If industrial arts teachers are to do a good job of teaching industrial information and skills, they must come to grips with the problem of technical vocabulary. It may truly be a neglected part in our study of tools, materials, processes, and related industrial information.

Now let's examine what words are, why technical vocabulary is so important, and what we can do about it.

Thomas Carlyle said:

"Man is a tool-using animal. No where do you find him without tools; without tools he is nothing. With tools he is all."

WORDS ARE the tools of verbal communication, either oral or written. It is highly probable that just about the time man fashioned his first stone tools, he also grunted his first words. Perhaps they were descriptive sounds or noisy symbols. Note that today we still say "buzz saw" or use a tool called the "rasp." Over the long centuries the sounds became meaningful words, sounding different in each language to be sure, nevertheless real tools of oral and written communication.

Races which failed to develop an adequate vocabulary made little progress. The Australian Aborigines and the Ecuadorian Indians are still in the stone age.

WORDS are the keys to many kinds of storage systems. When the filing clerk in a drafting room stores a drawing or a blueprint, he may store it by the number, but he usually stores it by the name (*a word*). If he stores the drawing by its number, he needs an index, or a key of title words, that tells him which drawer to use and where to look later. Woe be unto him if he makes a mistake. Precious man-hours may be lost in retrieving the drawing.

Today we use microfilm drawings and carefully devised punch card systems to store the little films. But we still rely on words as well as numbers to do the job. Industrial drawings have titles (again words) that play a part in the storage system.

Quite obviously, we must use words when we go to the library for information. We usually start with a word and pursue our search further, step by step, with words. The Dewey Decimal System, and other library systems, are correlated with words and their meanings. The "key" function of words is not limited to books and periodicals. The industrial arts student or teacher uses words when he selects supplies, even the run-of-the-mill type, from a vendor's catalog. Such a volume, for example, has 35 pages of index set in three columns of type. Each page contains about 180 words. The catalog lists a total of 6,300 terms—all words that may be used sometime in an industrial arts shop.

We are on the brink of a tremendous breakthrough in the storage and handling of information. The Automatic Abstracting System, based on the work of Peter Luhn of International Business Machines Corporation, extracts words from technical articles and delivers enough meaning in the form of an abstract so that the reader can then decide whether to study the original source. A computer alphabetizes every word, looks at every sentence, computes a score for it, and delivers to the reader the percentage of the article (10 percent, 20 percent, or so on) that the reader specifies.

In October 1960 a Russian translation system, sponsored by the Air Force, goes into pilot operation. Russian articles are photographed on 70 millimeter film. An optical device scans the lines and converts the words to electronic pulses. Then the pulses are compared with those of a photoscopic memory unit for matches in English. When a match is found, the English equivalent comes out. Eventu-

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Mr. Thomassen is Industrial Education Editor, School Department, McGraw-Hill Book Company.

ally the machine should deliver 1000 characters per second at a cost of about ten cents per 100 words. This system is expected to take care of the Russian-English translation needs of the whole federal government and military establishment.

What these systems promise for the future is exciting to predict!

Our libraries will be mechanized with electronic searching systems—and there will be other interesting applications. All of these time savers, nevertheless, make use of words and require a clear understanding of their meaning and the part they play. Without it we cannot use these wonderful devices.

INDUSTRIAL ARTS teachers work mostly with three-dimensional media. They tend to think this way, and would communicate this way if they could. Most of us agree that only the finished project can do so, and in many cases the article does not lend itself to accomplishing this objective. So, we resort to the system of orthographic projection whereby we show three-dimensional objects on paper in planes of two dimensions. Orthographic projection works fine in showing construction details, but try completing the project or the production process without words. Orthographic drawings show concrete objects in a splendid manner, but they do not give exactly directions such as heat treating without using words. We can use a finish symbol *V* for example, but this symbol stands for a word, the word stands for a process, which further involves tools with word-names and methods of using tools that are described with words.

Pavlov's experiment with a dog laid the groundwork for research about reflexes. We have come a long way since then, and today psychologists believe that words, their meanings and their function in communication and thought, may belong in this general realm of knowledge. Most of us react in a definite way if someone yells, "Fire!" in a theater. Words evoke patterns of reaction and patterns of thought. The more words you have at your command, the more sophisticated your thought, and greater (will be) your ability to communicate and solve problems.

Product Engineering features a column entitled "Why Don't They Research and Develop." Newspapers and other technical magazines carry similar articles about the needs of our Armed Forces. These requests are described mostly with words, because no one yet has designed and drawn what is needed to solve the problem. This is pretty high level stuff, but the part that words play is most important.

SCIENCE AND TECHNOLOGY flood us with new words, and at a rapid, geometrically-increasing rate! The English language contains several hundred thousand words. It is always changing. Every new discovery and its application breeds a new family of words. Many of them are coined words such as radar, sonar, loran, rayon, nylon, orlon, and superheterodyne. Some are old words with new meanings, or new connotations, such as jet, fusion, frequency modulation, semiconductor. Some of the new words stand for whole mechanic or electronic systems and have vast connotation. Many get into the common language quickly, and become symbols (FM, TV, H-Bomb). About a year and a half ago (March, 1959) the writer tried to pin this down. He received the following reply from P. B. Cove, General Editor of the G. & C. Merriam Company, publishers of the Merriam-Webster dictionaries:

"We are sorry that we cannot supply the information you want on the number of new technical words added to the language in recent years. . . . Until every term in the language, with the date of its first written occurrence and other pertinent data about the term, is transferred to some record such as a punch card, and placed in an inclusive file from which desired information may be extracted by electronic device, we are sure that it would be impossible to determine how many new words of any particular kind have come into the language in any given period. We are constantly faced with the problem of extracting from the niagara of new terms in all fields of human knowledge . . . those terms that are of sufficient general interest to merit entry in the dictionary.

"Some idea of the extent of the technical vocabulary of our langauge will be gained from a consideration of the fact that in the field of organic chemistry alone, that is, in one branch of chemistry which is itself only one branch of scientific knowledge, over 700,000 compounds have been discovered and named. . . .

"In *Webster's New International Dictionary*, Second Edition, there are about 600,000 terms defined altogether. New technical terms are found in every issue of the technical periodicals we check. . . . In addition, other types of written material in which technical terminology occurs are checked, such as reference and textbooks and supply catalogs."

We may argue that few of these new words should concern industrial arts students. When next you read the new issue of a technical or popular scientific magazine, keep track of the new terms you find there. Some of them will soon be in the common language. In our shops today, furthermore, we use such words as "plastic-resin glue," "oribital portable sander," "oscilloscope," "scanning," and many other common terms that have new meaning or new connotations.

For years publishers have recognized the problem of keeping up with science and technology. Soon there will be published a 15-volume, 9,300 page *Encyclopedia of Science and Technology*. Every effort has been made to present this material at the layman's level—suitable for a high school graduate. The scope of the problem, nevertheless, is revealed by the index, which will contain some 300,000 references. There are 7,200 articles varying from 100 to 15,000 words. More than 2,000 noted specialists contributed to the encyclopedia, each using *words* to present the basic knowledge in his field. Many of these subjects will be of interest to the industrial arts teacher and student.

THE CHANGING PATTERN of production and distribution will require greater use of words.

In 1958 there were about 65,000,000 people employed with an output of $3.29 per man-hour. The McGraw-Hill Department of Economics has forecast that in 1975 there will be about 88,000,000 people employed whose output per man-hour will be $5.14. They predict that the work week will decline from an average of

BETTER UNDERSTANDING OF TERMS MEANS A BETTER ALL ROUND PERFORMANCE

39 hours to 35.5 hours. (These figures are based on 1957 prices.) Thus, the output per man-hour increases while the working hours decline. These economists also project a jump in Gross National Product from 434.4 billion dollars in 1957-58 to 835 billion in 1975. However, they carefully point out that this growth will depend on the size of the market to be served, the labor force available, and the *resources and skills that the labor force can put to work.* In this report, *The American Economy: Prospects for Growth to 1965 and 1975,* they further point out that "in the factory more and more of the work will be handled automatically as we move toward 1975. In some plants, high speed conveyor systems will connect almost all machines. Better conveyors, more powerful motors, and new devices for turning and positioning heavy pieces will make it as easy to move heavy metal parts from station to station as it is to move lighter products today.

"As machine tools operate at higher speeds, work will be fed to them from automatic conveyors and controlled by electronic mechanisms. With electronic controls, an entire succession of tools can be supervised by one man. And sometime before 1965, we may see complete automatic assembly operations. With electronic "brains" it may be possible to direct mechanical fingers in assembly operations that today require many man-hours."

This description connotates what we know as "automation"—a word wildly tossed about today, and often little understood. What does it mean for the boys and girls in our industrial arts shops and classes? A wrench or special tool that a man uses on a production line is a tangible object with a name that is a concrete word. To the man running the tool crib it may be a specific kind of wrench. The accountant in the Purchasing Department may keep track of it under the classification "Tools." To the plant engineer it is "Production Equipment," and to the secretary in the company treasurer's office it is a "Capital Investment." Words are used to keep track of these items, and in the case of complicated tools, you need complicated words. As you get further from the actual use of the wrench, the word used to describe it becomes less concrete and more abstract.

Fortunately, the names of tools, materials and processes have specific concrete meaning—which may or may not be fully understood by the people using them. But as you get further away from their actual use, their meaning becomes more abstract, and more difficult to understand. If the people who use these terms have a better understanding of them, we can expect better performance all around. In the future words will become even more important, for as automation increases, fewer people will be directly concerned with using the tools themselves, or supervising the processes themselves. Since industrial arts teachers are concerned with preparing people for their future life in business or industry, a basic familiarity with technical words will be even more important.

> "Men ever had, and ever will have, leave to coin new words well suited to the age. Words are like leaves, some wither every year, and every year a younger race succeeds."—HORACE, *Ars Poetica,* 1680

Because fewer people in the future will be directly involved with production, a greater proportion of our people will be more concerned with distribution and service activities. No longer can a mechanic or service man call a tool a "gizzmo" or part of your automatic washer a "widget." To do a good job, especially when it comes to diagnosing troubles, he should know the proper names for these parts, their meanings, and their function.

Because we are eminently an industrially orientated people, the use of technical words pervades most of our business and industrial activity. Charlie Wilson, of General Motors fame, once said that no transaction in business or industry takes place without a piece of paper. These pieces of paper contain words, and employees should know what they mean. The students in your industrial arts classes and shops are the employees of tomorrow.

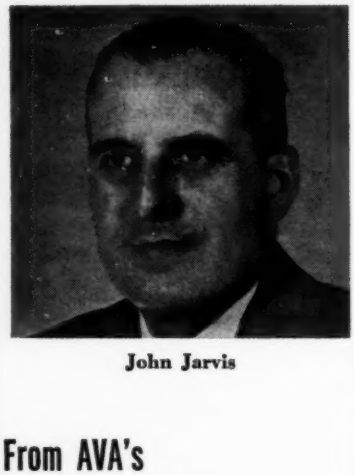
DO WE IN industrial arts believe that adept use of technical vocabulary is also a skill?

Certainly we pay close attention to manual skills and craftsmanship. Do we realize that in the future this will not be enough? Our students must be articulate. As mature citizens and employees they will have to communicate as accurately as possible on their jobs. Their progress as individuals will depend on their use and command of technical words; indeed our national survival may also depend on it. Now, what can industrial arts teachers do about technical vocabulary? Here are a few suggestions.

• *Let's change our attitude about words and language.* This calls for some careful soul-searching! Did *you* decide to be an industrial arts teacher so you could get away from the "academic subjects?" Fortunately most modern industrial arts teachers know that the old "manual training," trades-orientated teacher is a thing of the past. Industrial arts subjects are every bit as academic as English or social studies. They have their own splendid history, a "literature" of their own if you wish to search it down—some of which makes fascinating reading, and a language that may be more useful to the student than the words found in Thomas Hardy or George Eliot. There is nothing "sissy" in teaching the importance of words in an industrial arts shop. Here is the place where you can really put English to work! Although the misuse of a word, or a grammatical mistake, may offend your old maid aunt, in the shop or drafting room it may lead to a grievous injury or waste of materials.

• *Bring your understanding of linguistics up-to-date.* Borrow some recently published high school or college English books and see what modern authorities have to say about words and their use in verbal and written communications. The chances are you will be surprised if you have been out of college longer than five years. As a start, Hayakawa's *Language in Thought and Action* will stir up your brain a bit. There are other important books that the English Department can list for you.

(continued on page 50)



John Jarvis

From AVA's Vice President for Industrial Arts—

THIS issue of the AMERICAN VOCATIONAL JOURNAL features industrial arts and includes a number of articles which should be of immediate value to all those interested in this curriculum area. Topics discussed by the several authors are timely and the discussions are thought provoking. With one exception, all the articles were written by persons active in some phase of industrial arts: a teacher, a supervisor, a teacher educator, and a textbook publisher.

The authors are to be complimented for the quality of their articles and for their willingness to share with us their professional knowledge.

The Editorial Committee of the Industrial Arts Division of the American Vocational Association, under the leadership of Dr. G. Harold Silvius, Chairman, chose the areas of discussion and the participating authors. Members of this committee are Ralph C. Bohn, Roy V. Orendorf, and Robert Swanson. The contribution of all committee members was substantial and is certainly worthy of commendation.

The Editorial Committee and I feel that the articles in this issue will prove well worth your reading.

JOHN A. JARVIS, *Vice President Industrial Arts Education*

By Dr. Robert H. Beck and Dr. Howard F. Nelson

INDUSTRIAL ARTS IN THE 60's

IT IS A TRUISM that 'hindsight is better than foresight.' Each of us interested in industrial arts would like hindsight on what the 1960's have yet to reveal. The more imaginative among industrial arts teachers might compose a retrospective bit of fantasy, on the order of Edward Bellamy's classic, *Looking Backward*. That would be a risky venture; students and teachers of industrial arts are notably Missourian in their appetite for facts. To strike a compromise, we propose to suggest extrapolations for a ten-year period of information now on hand. The projection will be guarded; fantasy minimized, though not, we hope, at the cost of imagination.

The data to be "worked" includes such current fact and opinion as the four that follow.

Dr. James B. Conant, the single most influential commentator on American high schools, has become convinced that the decade ahead is one in which the United States is critically challenged. In Dr. Conant's mind, these are times of grave national emergency. The alternative before us he sees to be one between "freedom" and "slavery". In order to conserve precious manpower, Dr. Conant would have the academically able young people attend college and, for that attendance, study in high school as much mathematics, physical and biological science, English, modern and foreign languages, and social studies, as is possible. Industrial arts, together with music and fine art, Dr. Conant regards as an elective subject, and, one infers, electives are luxuries in times thought so critical that national survival is threatened.

WE SHALL take issue not with Dr. Conant's guess that the times are very critical, but with his view that only subjects that conventionally have been thought academic are indeed for the academically most able or should be part of the general education of all. In our opinion, industrial arts is both a part of general education and can be well worth the "study" of most talented students.

There is reason to believe that there will be more hours for do-it-yourself projects at home. Many of these, if they are to involve an intelligent use of tools and work with leather, wood, plastics and metals, call for the varieties of experience which industrial arts laboratories and workshops commonly provide.

It is significant to note, parenthetically, that these first experiences with materials, machines, plans, directions, techniques, processes and practices can be given in industrial arts and under conditions involving *safe* instruction not to be duplicated elsewhere.

At least half of the nation's senior high school population will not continue into full-time schooling beyond high school. For many of these young people, for whom high school is terminal, experience with industrial arts may well prove the practical assistance

to their prevocational counseling—the process of "finding themselves."

The subject area of industrial arts can afford educative experience leading toward realistic understandings of occupations, vocations, jobs and work. These understandings, one may presume, will help develop appreciation of the importance of the individual who has learned to do his job well, who is held competent among people in his field of work whether it be at school, in a business, a factory, on a farm or in an office.

Industrial arts should constantly emphasize and attempt to develop the concept that employment in some useful pursuit is "in the scheme of things" and that it is the student's personal responsibility to arrive at the door of employment with proven, marketable assets.

For students who will move from high school to college or university study in science and technology, industrial arts workshops can be invaluable supplements to physics and engineering laboratories where tools and machinery usually are absent; where mechanical or Architectural drawing also may be absent. The theoretical study in mathematics and the sciences must be supplemented by experience of the type common to all well-equipped industrial arts sequences. Where industrial arts has been permitted to run beyond a single course, it inevitably involves true laboratory work in technology, be the technology that of electronics, metallurgy, automotive mechanics or the various fields of design.

FOR THESE REASONS we shall argue that industrial arts be viewed for what it is, a contributing subject matter area of general education, worthy of requirement for *all*. It has as one of its functions, a responsibility for fostering and developing important skills, knowledges, attitudes and appreciations designed to aid students to understand the industrial and technological portions of the environment. As technology becomes more complex, opportunities for obtaining clarification and explanation of "how things work" become more difficult of satisfaction.

The circumstances mentioned afford an unusual opportunity for industrial arts to make a unique contribution to general education through its practice of drawing from industry experiences which can be adapted for instructional purposes. It will serve this function well to the extent that simplified, yet essentially characteristic practices and processes, are replicated in industrial arts instruction. We would wish to emphasize our belief that as an elective, industrial arts should offer advanced sections open to all who display interest, aptitude or achievement *by performance*. In this election process, industrial arts does not differ markedly from advanced mathematics, science or languages which also must be available as electives.

Reviewing these four areas of concern, only one will be seen to be wholly speculative: that of Dr. Conant's conjecture. Let us suppose that Dr. Conant is correct, that today we can defend freedom only by increasing the number of academically able students studying foreign languages, mathematics, science, English and social studies. *Unless the school day is modified*, a conventional program filled with the conventionally defined academic studies will squeeze out electives almost altogether.

Would this be a good thing?

We propose that it would not, citing as our primary arguments the value of industrial arts as a supplement to pre-collegiate scientific training, to vocational counseling, and avocational experience.

OUR PROPOSAL to Dr. Conant is this: English should be available five days a week, but all other subjects, electives included, should be offered two-or-three times weekly. By continuing mathematics, foreign languages, social studies, sciences, and industrial arts throughout the junior and senior high school, it would be possible to have more of these subjects available than is presently possible and that without sacrificing electives. Second: periods should be shortened and seven periods daily scheduled.

Looking forward to 1970, we would go one step further. If industrial arts is thought of in terms of general education, industrial arts would be seen as one of the most important of subjects, and not as an elective dispensable when one thinks in terms of general education.

There is point to interrupting the chain of thought long enough to ask why drama and speech are not thought a part of general education, and what is to be the fate of music, athletics, student publications and clubs?

In our opinion, speech and drama should not be thought electives, except for advanced play-writing, acting, or staging. Speech and drama are integral parts of English. Music, too, we would have scheduled twice or three times weekly. Advanced instruction in music, as in painting and in other art media, requires large blocks of time for practice, instructions, and rehearsal. These large blocks of time should be made available either after school or on Saturday mornings. Indeed, after school hours should not be preempted by any single extra or co-curricular activity.

Athletics, for example, well might be limited to two-hour practice sessions —two or, at the very most, three days a week. In such scheduling, students are not over-taxed and activities other than band or athletics have opportunities for instruction and practice.

The place of most other electives cannot be discussed within the confines of this essay.

THERE ARE two final general points. The first point is that there should be no competition between crafts, fine arts, and industrial arts.

The second general point is that if industrial arts be seen a part of general education, industrial arts courses are to reflect this identification with general education without sacrificing the value of industrial arts experience for a vocation, for pre-vocational guidance, or for pre-collegiate, scientific-technological study.

The distinction between fine-and-industrial arts is not altogether invalid. Painting, as an example of a fine art, is less akin to industrial arts than sculpting, ceramics, jewelry-making, or weaving. Painting it will be recalled to be another after-school or Saturday morning activity. Again, as with advanced music, professional instruction is needed and there is no good reason

WHAT ARE THE OBJECTIVES THAT SHOULD GUIDE AND GUARD THE PROGRAM AT ALL LEVELS?

why there should not be painting classes throughout the summer.

However, inasmuch as industrial arts in the present and in the future should study design in product, there is a fine-art element, and esthetic portion in industrial arts. This esthetic part, we believe, will be ever more in evidence as students of industrial arts review furniture design, machine design, and design in, and for, living. This is the point of maximum continuity between industrial and fine arts.

OUR CONCLUDING POINT is one of reminder. The reminder is not so much to ourselves as to our academic colleagues. We in industrial arts offer teachers of mathematics and science an opportunity to supplement their classroom discussions of theory and their laboratory demonstrations or experiments.

For example, in the study of radio and electronics, we can illustrate and apply the "field theory" of electro magnetics as it operates in television. We can observe polmerization as it occurs in plastic sheet and its processing. Or, use the math concept of an RMS average as it applies in electronics and in surface trueness of machine shop projects. The internal combustion engine was built on application of scientific study for the behavior of gases in relation to temperature and pressure. Therefore, industrial arts and automotive workshops are laboratories for studying elements of thermodynamics.

INDUSTRIAL ARTS teachers have not been laggard in advancing the general, rather than the pre-vocational educative function of their field. We do not feel that there is likelihood of retrogression of *that* point. Industrial arts has grappled to itself a concern with the esthetics of design, the story of tools and invention, awareness of the history of technology, an artistic appreciation of such media as metal, wood, stone, plastic and leather, as well as workshop initiation into the model building of geometry and the benchwork of the physical sciences. Our thought never wavers in its conviction that industrial arts during the ten years ahead will be *known* and at long last, appreciated for its truly *general* sensitivity.

Where there is some trace of anxiety in our look ahead, it is with the possibility that in order to justify itself to such men as Dr. Conant, industrial arts will cater only to those who can deal skillfully with electronics, advanced design, etc. The authors of this essay are committed to the idea and ideal of education for *all* American youth. No more would we wish to have industrial arts thought of as a dumping ground for academically disabled students than we would wish or desire for "academic respectability" to lead in the direction of opening our classes only to the academically or manually most able.

We would wish that advanced, technical industrial arts courses be made available. Selected offerings, taken by high school students, will enable those who are college-bound to enter with advanced standing in the fields of drafting, electricity and electronics, machine shop and similar areas. This is perfectly possible. But, these advanced experiences need not preclude others less demanding.

Is it our surmise that industrial arts will flourish in the decade now begun? It is. Our optimism is based on the fact that industrial arts teachers have been eager to experiment, have been patently self-critical. Among parents there will be no lessening of appreciation for a field that has grown from the spirit of modern times, from a technology that has been all-pervasive, whether in commerce, business, or production of capital and consumer goods. There is no area of high school instruction that offers such genuine inducement to the original, creative, and thorough. No stock answers need be thought satisfactory; the limits on ingenuity and craftsman-like work are literally without boundary.

Rather than being on the defensive, those of us in industrial arts education turn to our colleges in science and say, "In our workshops and laboratories students will be able to be realistically challenged to carry their interest in tools, machine-processing, and design into the study of elements of the history of art, architecture, science, invention and technology. The role of industry, of capital, of labor, and of management in industrial arts have an opportunity to be of interest beyond what can be hoped for in even a well-designed high school course in economics. For those to whom planning and discipline in habits of work are important, the projects that are in industrial arts have proven themselves to command and hold the interest of boys and girls who otherwise seem to feel demands of school rather artificial."

TURNING TO our professional friends in industrial arts, we would ask them these rhetorical questions, asking them in the hope that working at their answers will be almost the most rewarding research we can undertake in the next decade.

Where does industrial arts want to go in the 1960's?

What are the essential needs of youth which can be wholly or partially satisfied through the subject's laboratory type experiences?

What can industrial arts contribute to general eductation which is genuinely *unique?*

What are the significant kinds of behavior changes which can, and should, be brought about—can be done best through the instruction and experiences of industrial arts?

What evidences can be obtained through evaluation procedures to provide a measure of these behavorial changes?

What are the most effective and efficient instructional methods and materials to bring about these changes?

What are the most advantageous and efficacious forms of course content organization?

What distillations from research in education impinge upon the teaching-learning process?

What circumstances, conditions or situations are the most conducive to the development of desirable work attitudes and appreciations?

Which areas are truly important and worthy of being accented, and which current ones should be depreciated?

Specifically, what are the objectives that should guide and guard industrial arts at all levels? In the light of objectives, what should be taught? What skills should be developed, what related information should be taught, what special attitudes and appreciations should be brought about?

Students Ray Phy, Walter Pawlak, and Joe Hoover go over details of the barbecue with Mr. Boogren, drafting teacher and project chairman. Scale model of patio was built by woodworking classes.

project patio

FITZGERALD'S PROJECT PATIO is more a monument to cooperative effort than a tribute to any one person or group. Many skeptics felt the project would never get beyond the planning stage, and those who conceded the start of the project were certain it would never be completed. "It demands too much cooperation." "It'll take too long." "Interest can't be maintained." "The money to support it can't be raised." "The kids can't do the work." These are just a few of the many arguments raised by the non-believers.

Under the effective leadership of the Faculty Advisory Committee, however, these and other problems were solved. Today, Project Patio stands completed, beautiful, and practical. Cooperation won over skepticism.

The idea for a patio grew from student requests for outdoor eating space in the courtyard beside the cafeteria. After the idea was considered and approved by the student council, it was presented to school administrators. They recognized in this an opportunity for combining various areas of the curriculum in a meaningful all-school project. With this thought in mind, a committee that included the high school principal, the director of vocational education, a drafting instructor, an art teacher, the basic construction teacher, a biology teacher, the director of student relations, and the student council president was organized.

After careful study by the committee, the plan was announced to the student body. Since the patio was to be entirely a student project, even the design and plans had to be drawn by students. The student council organized a contest, open to any student in grades 7-12. Anyone eligible could submit his original plan to the council. Entries, drawn to scale, ($1\frac{1}{4}$:1′) had to include designs for a dining area, lawn, shrub and plant area, and lighting facilities. The winner would get a $25 bond. Certificate awards would be presented to those students whose plans contained some feature which could be incorporated into the final plan.

The contest was underway. The student council's publicity machinery went into action, and before long entries were coming in. Judges studied the many entries carefully, and they argued long trying to select the best plan. Finally, on the basis of neatness, originality, completeness, and economy, the winning draftsman earned his prize. Several other plans contained worthwhile features, and their creators were rewarded too.

Combining the desirable individual

features from other plans with the winning entry became the objective of the advanced drafting class. Kenneth Boogren's boys, most of whom were seniors, worked diligently to complete their work before graduation in June, '58. The school architect approved their plans with only a few minor changes.

The following September, a new student planning group picked up the task. Final blueprints were drawn and approved by school administrators and the board of education.

Now, students tackled the job of getting estimates on and ordering materials, handling bills, plotting progress and making necessary changes.

GROUND WAS broken in the fall of 1958. Superintendent Earl S. Eidt turned the first shovelful of dirt and then gave way to William Carr and his basic construction class who set to with picks, shovels, and plenty of vigor. It was to be this class and their successors of the next year who would do most of the "heavy" work on Project Patio.

Eager, hard-working boys laid footings and foundations. They determined grade levels and dug trenches to receive the water lines, drain tile, and electrical conduits. Next they set, placed, and leveled foundation forms. Everything was ready for the job of pouring concrete. The patio was beginning to take shape.

This mammoth task brought to Project Patio unexpected cooperation. Saturday "work parties" were organized. Faculty members, maintenance staff men, and students participated voluntarily in these "overtime" sessions. The homemaking department pitched in by serving the men coffee and sandwiches.

Winter finally halted outdoor work, but the project continued indoors. The construction class routed electrical, water, and drain lines into the school tunnels and connected them to the school's main systems. Construction of the picnic tables and louvered fences was started. The magnificent redwood beams, which would form the superstructure over the barbecue area, were cut, sanded, drilled, and semi-finished.

Meanwhile, in another area of the building, under the direction of industrial arts teacher, Joseph Teufner, work was begun on the plastic fabrication required for the patio. After some research, this crew discovered that the picnic table and bench surface could be best protected by applying polyester resin reinforced with spun fiberglass. This combination was applied to the plywood base construction of the tables and benches. After the plastic was cured, it was sanded and buffed to a high gloss. Next, this now "experienced" plastics class took on the job of fabricating a catchment pool for the patio's waterfall.

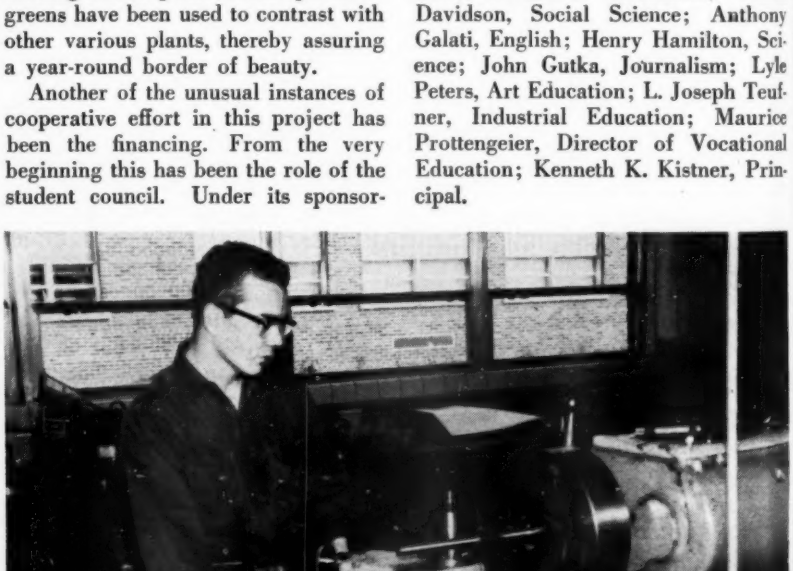
CONSTRUCTION CREWS went outdoors again in spring, 1959. Now came the backbreaking job of erecting the brick barbeque pit, pool foundation and cascade wall. Concrete slabs for the dance and picnic area were laid and a beautiful redwood canopy over the barbeque area was completed. Then a green plastic roof was added and the louvered fences were put in place.

With the patio structure itself completed, there remained only the delicate job of landscaping to bring a three-year-old dream into reality. This task produced further inter-departmental cooperation, as it was directed by Henry Hamilton, biology teacher. His decisions determined the variety and number of the shrubs. The hedge-design landscaping, which borders the patio on three sides, blends it into the existing building and landscape. Evergreens have been used to contrast with other various plants, thereby assuring a year-round border of beauty.

Another of the unusual instances of cooperative effort in this project has been the financing. From the very beginning this has been the role of the student council. Under its sponsorship, an annual push cart race has been held to provide funds for the patio. The rules of this race allow any club, class, or team to enter a cart after paying a five-dollar entry fee. Carts must be safe, must not be mechanized, must carry a rider, and must be pushed around the track by various members in relay fashion. This race is held outdoors on a spring afternoon. Trophies are awarded to winners in both senior high and junior high divisions. Additional recognition is given to carts which are most original in design and best constructed.

FROM DREAM TO REALITY Project Patio has been three years in the making. Considering the problems of personnel turnover, summer vacation, limited school time, and financing, this is an amazing feat. A project such as this is more than an argument for perseverance. It is a sign of real confidence in student ability and effort. It is proof that with cooperation difficult tasks may be solved. From the very beginning of this project the keynote has been cooperation. The reward is a thing of beauty, permanence, and utility—Project Patio.

Note: The Project Patio Advisory Committee consisted of: Kenneth Boogren, Industrial Education; William Carr, Industrial Education; Mark Davidson, Social Science; Anthony Galati, English; Henry Hamilton, Science; John Gutka, Journalism; Lyle Peters, Art Education; L. Joseph Teufner, Industrial Education; Maurice Prottengeier, Director of Vocational Education; Kenneth K. Kistner, Principal.



A machine shop student makes his contribution to the cooperative project

By Dr. Robert M. Worthington

Intro to a Symposium

THREE SIGNIFICANT ARTICLES in this special issue are based on the Symposium on Industrial Arts in Education conducted as a part of the industrial arts education division program at the 1959 Chicago AVA convention.

This Symposium brought together more than 300 industrial arts educators from all parts of the nation. Consultants from industry also participated. It was planned around topics which national leaders seemed most concerned about as they reacted to a proposed brochure designed to inform lay persons and other educators outside the field about industrial arts education.

Pooling the thinking of many national leaders in industrial arts education is not an easy task. Yet this was the assignment Dr. G. Harold Silvius undertook when he was named chairman of a committee to revise the AVA Industrial Arts Education brochure, *The Place and Purpose of Industrial Arts in American Education.** The original brochure edited by G. Wesley Ketcham was one of the most widely circulated documents on industrial arts education ever published.

Dr. Silvius, with the help of a committee including Robert Swanson, Ralph Bohn and Roy Orendorf, prepared a draft based on suggestions from industrial arts leaders from all parts of the United States. In circulating this draft for further suggestions and comments the committee found that certain items elicited the greatest reaction. Among the items most often mentioned which seemed to merit thorough discussion at a national symposium were the following: *Integration of Science and Mathematics in Industrial Arts; What Emphasis Should be placed on Plastics, Textiles, and Ceramics?; The Role of Guidance in Industrial Arts; An Evaluation of the Unique Contributions of Industrial Arts; Industrial Arts for Girls and Women;* and *Problem Solving, Creative Expression, and Experimentation in Industrial Arts.*

As a result of panel discussions on these topics three articles have been prepared for this issue of the JOURNAL. These articles attack problems of great significance for industrial arts in this era of change in educational emphasis. In many school systems industrial arts has had to fight for its life amid growing demands for more science, mathematics, and foreign languages.

Dr. Robert D. Brown and Dr. G. W. Newbauer will consider the educational values of the program that are not inherent in any other area of general education. Dr. John R. Lindbeck and Dr. Ernest L. Minelli will point up the challenges that industrial arts must meet in this age of science and technology.

The important contributions of industrial arts teachers to the school guidance program are emphasized by Dr. Howard F. Nelson and Dr. Willis E. Ray. Participation in the school guidance program is a professional responsibility which the industrial arts teacher must face. The nature of the industrial arts program makes it an ideal setting for functioning participation in the guidance program.

We invite your reactions to all of this material.

Dr. Worthington is Head, Industrial Arts Department, Trenton State College, Trenton, N. J.

* The revised brochure by Dr. G. Harold Silvius and the Editorial Committee entitled, *Industrial Arts in Education*, is now available from AVA.

Experts Evaluate

Industrial Arts' Unique Contributions

IT HAS BEEN largely accepted that the purpose of general education is to prepare students to live effectively in contemporary society, to contribute to the improvement of society, and to adjust efficiently to the changes which are inevitable. Hence, as a reflection of certain technological aspects of the culture, industrial arts plays an essential role in the preparation of an effective person.

Of course, this industrial area performs numerous functions which are not unique, but what are some of the singular contributions which a study of the industrial arts can make? Although others may be identified, the following are suggested for consideration.

Industrial arts develops manipulative skills involving tools, processes, and materials of industry and provides a diverse range of opportunities for self-expression.

Though the instruction is not vocational in character, it develops familiarity with processes and materials which may be employed in a variety of situations ranging from applications in specific professions to leisure-time creative pursuits providing personal satisfaction.

WASTE OF CREATIVE AND PRODUCTIVE POWER IS AN APPALLING NATIONAL PROBLEM

Practical experiences with tools and materials permit the clarification of abstract concepts and their meaningful application.

Many students find they are better able to grasp and manipulate abstractions in terms of practical situations. Hence, the use of specific concepts and materials in the solution of problems involving planning, experimentation, and/or construction permits the functional application of student ingenuity.

However, it should be emphasized that project construction is not the goal of industrial arts. It is simply a device, not unlike a science experiment or an arithmetic problem, for developing particular concepts, not an end in itself.

The attention directed to cooperative planning and problem solving permits essential emphasis upon creativity, experimentation, and inventiveness.

One of the most sought after outcomes of the educational process is the development of an individual who is able to recognize a problem, pose it in manageable terms, bring to bear pertinent evidence and skills upon tentative solutions, and evaluate the effectiveness of his efforts with an eye toward improving future performance. With the aid of his instructor and fellow students in industrial arts, the pupil is able to do just that in formulating learning experiences having interest and challenge in terms of his ability level.

Activity with tools and materials requires that safety practices be observed, impressing the student with the importance of safe work procedures.

In working through the solutions to problems of school and industry, it is essential that logical and safe operating procedures be employed. This is not to deny the importance of bringing to bear originality and novelty to a challenging situation, but to emphasize the importance of tempering unbounded creativity and enthusiasm with the logic and precaution imposed by the limitations of tools, machines, and material characteristics.

Information and experience obtained in the purchase, use, and maintenance of a range of industrial products emphasize the importance of consumer values, including principles of design and utility.

In addition to participating in the creation and construction of articles having interest and utility, the student is brought into contact in a controlled situation with numerous products of industry. These he has opportunities to examine, operate, maintain, and criticize. Upon the basis of this study and observation he is kept abreast of current industrial developments and is in a better position to use the resulting innovations more intelligently.

Exploratory experiences involving a diversity of industrial applications contribute sound guidance in the investigation of potential vocations.

The appalling waste of creative and productive power is one of the most pressing problems confronting the nation. The Communist challenge and the needs of under-developed peoples pose a challenge which no longer permits the national luxury of frustrated talents. Too many high school youth

By Dr. G. W. Newbauer and Dr. Robert D. Brown

are graduating with only the haziest notions of their abilities, while the drop outs, whose potential has often not even been recognized, are a national tragedy. Industrial arts experiences invite the student to discover singular talents and interests and acquaint him with the promise of technology and with potential employment opportunities in a technologically-oriented society.

IN ADDITION, industrial arts functions in a unique capacity. It demonstrates a method of instruction in which the student is involved mentally and physically, and it possesses a wealth of content for application. Inherent in this duality lies the opportunity to provide many and varied learning experiences which will stimulate the average student, reward those of lesser ability with a sense of accomplishment, and challenge the gifted. Such outcomes are limited only by the ingenuity and versatility of the instructor.

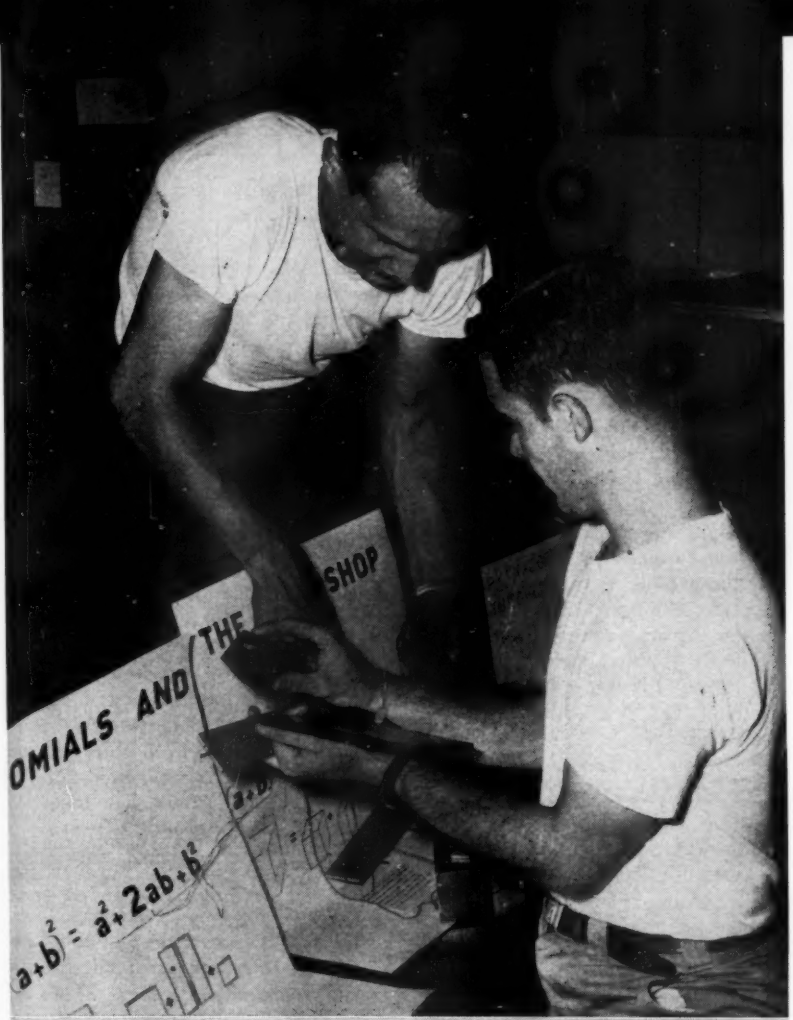
In spite of the contributions and achievements of industrial arts, soft spots remain. For example, all too many programs of 1930 vintage exist which foster neither creativeness nor problem solving. The continued use of kits and teacher-mandated projects for advanced students can hardly be justified although it is recognized that beginners must first become familiar with tools and the qualities of materials before they can exercise creativity or utilize available facilities intelligently in the solution of problems. Nevertheless, a more defensible practice appears to lie in the provision of orientative experiences involving projects permitting a degree of student choice and initiative.

The identification of certain deficiencies, however, is not sufficient cause for the industrial arts teacher to adopt a defensive attitude. Instead, he should take a long, critical look at this program and evaluate it as objectively as possible. Upon the basis of this scrutiny, he will find ways of improving his contribution to the total school program. Instructors who believe their courses are attracting abnormally large proportions of below average students might well reanalyse their offerings to devise further instructional experiences which will challenge and appeal to the talented.

THE IMPORTANCE of continuing evaluation should be emphasized. A number of philosophical objectives have been established to which industrial arts personnel generally subscribe, but outcomes must be critically evaluated in terms of claims to determine if the unique contributions attributed to the industrial arts are actually being realized.

Resource Persons: Dr. Shriver L. Coover, State Teachers College, California, Pa.; Dr. Marshall L. Schmitt, U S. Office of Education, Washington, D. C.; Dr. Roderick G. Kohler, Northern Illinois University, DeKalb, Ill.; Alfred Lease, St. Cloud State College, St. Cloud, Minn.; Claudius Wilken, St. Paul Public Schools, St. Paul, Minn.

Dr. Newbauer is Vocational Research specialist, Florida State Department of Education; Dr. Brown is Associate Professor, Department of Industrial Arts, Northern Illinois University.



By Dr. John R. Lindbeck and Dr. Ernest L. Minelli

A study of relativity:—

Science, Math and Industrial Arts

The Symposium—Part II

WITHOUT DOUBT, a democracy demands of its education both quantity and quality. With the challenge of quantity largely met, our attention today turns to improving quality; now more difficult than ever. Obviously, to meet this charge, there must be a constant quest for imaginative research and developments aimed at improving individual programs and closing the gap between life and what is being taught in our schools. Education would fail to fulfill its purpose if it did not contribute toward the progress of society.

Here are a few ideas which may help further the quest for meeting or perhaps fulfilling the challenge of quality education. Specifically we will deal with one segment of education, that of *science-math-industrial arts* relationships. Proposals are not to be interpreted as final plans of action, but rather to stimulate imaginative thought, research, and developments aimed at improving education in our secondary schools.

The ideas presented here concerning the integration of science and mathematics instruction in industrial arts are not necessarily unique nor untried. They can be found today in many American secondary schools.

THE INTEGRATION of instruction involving these subjects is not superfluous nor is it a pedogogical fantasy of any educator to inject something into the industrial arts area. The rationale, for the increased emphasis upon the scientific studies in industrial arts, was generated largely from the relationships ascribed between them.

Schmitt,[1] for example, sees some common elements within these areas: whereas science treats the life processes, and matter and its properties, industrial processes, tools, machines, materials, products, and occupations; and mathematics deals with exact relationships

Dr. Lindbeck is Assistant Professor, Industrial Education, Western Michigan University, Kalamazoo; Dr. Minelli is Associate Professor, Industrial Arts Department, Central Michigan University, Mt. Pleasant.

[1] Marshall L. Schmitt, *The Contribution of Industrial Arts to Mathematics and Science*, Address, U. S. Office of Education, 1958.

existing within a field of inquiry, and the deduction from others known or supposed.

Proceeding from these definitions, their relationships, and their implied curricular functions, Schmitt sees the following as ways in which industrial arts contributes to math and science:

- Through industrial processes by emphasizing scientific principles involved in zinc extraction, for example;
- Through tools, machines, and materials, by illustrating first-hand the application of principles of science, as the oil sump on a machine is illustrative of the motion of fluids;
- Through project planning, by affording students the opportunity to analyse procedures, to experiment and to think creatively;
- Through a study of industrial products, by pointing up the relationships between product and principle as in automobiles or thermostats; and
- Through a study of occupations, by emphasizing the role of technology in our society.

The result of the preceding analysis is Schmitt's 4-point plan for action:

- Evaluate and improve existing industrial arts programs by placing more emphasis upon experimentation, application, and analysis.
- Establish experimental programs in industrial arts based upon the five contributions.
- Establish experimental laboratory programs in industrial arts for physics and chemistry students.
- Request scientific laboratory programs from the science department for industrial arts students.

MALEY PRESENTS an interesting description of an Industrial Arts Research Laboratory instituted in a Montgomery Hills, Maryland Junior High School.[2] The class was elective and covered a considerable range in intelligence. Working closely with the science department, the methodology of science was presented and individual research problems were designed. The work was largely independent; tool and forming operations were demonstrated when they appeared appropriate; and information pertinent to problems and media was discussed with the group.

Some of the research undertaken dealt with such problems as the conductivity of heat in various metals; the erosion qualities of metals; the effects of heat and cold on glues; the effects of heat and cold on battery performance; and the development of an induction heater. Perhaps the most gratifying result of this experience was that the parents, the teachers, and the students enthusiastically received it. College-bound seniors in the vicinity wondered why they were not given the opportunity to participate in such a program. This is an excellent example of a new approach in experimental industrial arts programs.

Whereas Maley reports a program involving pupils with a broad intelligence range, others direct their thinking toward meeting the needs of the gifted student. Perry, for example, emphasizes the need for a renewed effort toward providing challenging experiences for the gifted student. Industrial arts teachers have done wonders for the slow learner through patience, understanding, and the willingness to meet him where he is. But, the same is not true for the gifted; the approach must be one of also meeting this student where he is and substituting a unique science or mathematics projects for a typical industrial arts project.[3]

Reports of other programs designed for the gifted come from several states. Texas is planning a pilot program dealing with engineering, descriptive geometry, electronics, and materials analysis. The Bronx High School of Science in New York has for several years been engaged in industrial arts programs for the gifted. The class is a laboratory for science students who may come and go as they see fit. The instructor assists students in planning their work, teaching them how to use tools and machines, and helping with material selection. An industrial science program is offered by the Los Angeles City Schools, open to science and engineering students, in which the emphasis is upon the testing of materials. Here again there is instruction in tool skills and machine operation. The Williamsport High School in Pennsylvania offered, in 1953-54, an accelerated electronics course which proved very successful.

It is obvious that the redirection of industrial arts activities at the high school level influences the college program. A most stimulating and far-sighted report of a proposed curriculum for industrial teacher education comes to us in *The Minnesota Pian.* This report is based upon a look into the future, a look at the type of teacher we will be needing in the years ahead. It is interesting to note how it treats the place of the sciences. The following quotation from it points this up:

> "The subject matter of industrial education represents, in large part, an application of science, mathematics, history, language arts, and other disciplines to everyday problems involving tools and materials. These relationships will receive much more attention and emphasis than in the past. This means that in their undergraduate training industrial education teachers will require many more learning experiences which require them to apply science, mathematics, history, and the other disciplines. Our future graduates will have to be much more than "thing makers" or "tool users." [4]

From this vantage point, we can see patterns of activity or plans emerging. They appear to be vectored into two primary channels; those pertaining to secondary school programs and those geared to the college level. We shall consider only the secondary schools.

SEVERAL AUTHORS and leaders have suggested that we put forth an effort to include more information and experiences in applied science in our existing industrial arts courses. They maintain that within these shop courses we can find a great number of opportunities to illustrate scientific principles and provide for some experimentation. Such a general approach

[2] Donald Maley, "Research and Experimentation in the Junior High School," *The Industrial Arts Teacher,* XVIII, (March-April, 1959), 12-16.

[3] Kenneth Perry, "Contributions of Industrial Arts to the Education of the Exceptional Learner," *The Industrial Arts Teacher, XVIII,* (May-June, 1959), 6-7.

[4] William J. Michaels, & Wesley S. Sommers, *et al. The Minnesota Plan.* Bloomington, Illinois: McKnight & McKnight Publishing Company, 1958, p. 23.

provides science education for all students, gifted and non-gifted alike. The significant factor here is, of course, that the industrial arts teacher undertakes to include this material in his teaching.

Another experimental program of a more general nature could be planned in which industrial arts students could take part in research activities as a portion of their regular work. Instead of thinking in terms of projects, *per se*, the activities could involve research problems related to scientific principles. This need not, and perhaps should not, be the major activity in the course, but instead merely constitute one segment of it.

A second type of high school plan is that which aims to devise experimental programs. There are those of a special nature which would be in effect experimental laboratories for gifted students, or for those interested in the sciences. This would involve the collaboration of the industrial arts and science departments in designing a satisfactory program. It would necessitate opening the shop to students with little or no experience in this type of work, and perhaps with little or no interest in the traditional industrial arts objectives.

These programs then might constitute possible courses of action. There are, to be sure, yet other approaches.

OUT OF OUR concern for this matter of involving industrial arts more closely with science emerges at least one possible danger—we can over-emphasize this involvement to the great detriment of our entire program. More simply, we must guard against the justification of our curriculum primarily in terms of how much science we can pour into it or of how much service we can be to the sciences in our schools. To do so would place us in the unfortunate position of being capricious, of hitching our wagon to this star of science. Any course of action we adopt must be taken with a sincere consideration for the objectives of our total program. We can improve our programs certainly by paying due attention to the scientific aspects of them, or perhaps by cooperating with science departments in some manner. We must never lose sight of what we are aiming to do through the whole of our industrial offerings.

Industrial Arts And Good Guidance

By Dr. Howard F. Nelson and Dr. Willis E. Ray

The Symposium — Part III

IN THE DECADE, new demands for excellence will be placed upon industrial arts and industrial arts teachers. They will not, however, be limited to the improvement of curriculum, laboratory instruction, or program organization and administration.

The industrial arts teacher of the 1960's will be called upon to be a contributing member of the total faculty in many of the ongoing processes of the modern secondary school. With consistently increased demands for improved guidance services, each staff member will be expected to contribute to this program to the best of his ability, experience, and training.

ASIDE FROM THE major assignment of teaching, no single element of the teacher's total responsibility affords a more significant professional challenge that to become an understanding, functioning participant in the schools' guidance program. To contribute actively is not an extra assignment. It is a basic responsibility of working with youth.

Sound guidance procedure always involves cooperative teamwork between skilled guidance personnel and classroom teachers. The hopes, anxieties, and problems of youth are not necessarily resident in the counselor's office and files alone. They are shared with classroom teachers as well. For some pupils, the teacher's share will far outweigh the counselor's.

Industrial arts teachers can make a less direct guidance contribution by employing the inherent content of the area itself. Through carefully selected and balanced learning experiences involving practical laboratory work, pupils can get to know a considerable amount about their industrial environment. There are rich opportunities to experiment at first-hand with tools, materials, and processes characteristic of industry.

Pupils can take part in planning and executing activities involving mechanization, automation, and production. Concomitant experiences have to do with standards, inspection, tolerances, and similar precision checks. Much can be done to clarify opinions and understandings concerned with industrial organization and management.

When laboratory facilities cannot provide for certain of these experiences, the teacher must arrange for visits and field trips or for carefully selected speakers who can provide the clarification. The average teacher can add much from his own work experience regarding necessary preparation, work requirements, opportunities for advancement, and perhaps job security and fringe benefits. This seems to be a natural approach to guidance through industrial arts.

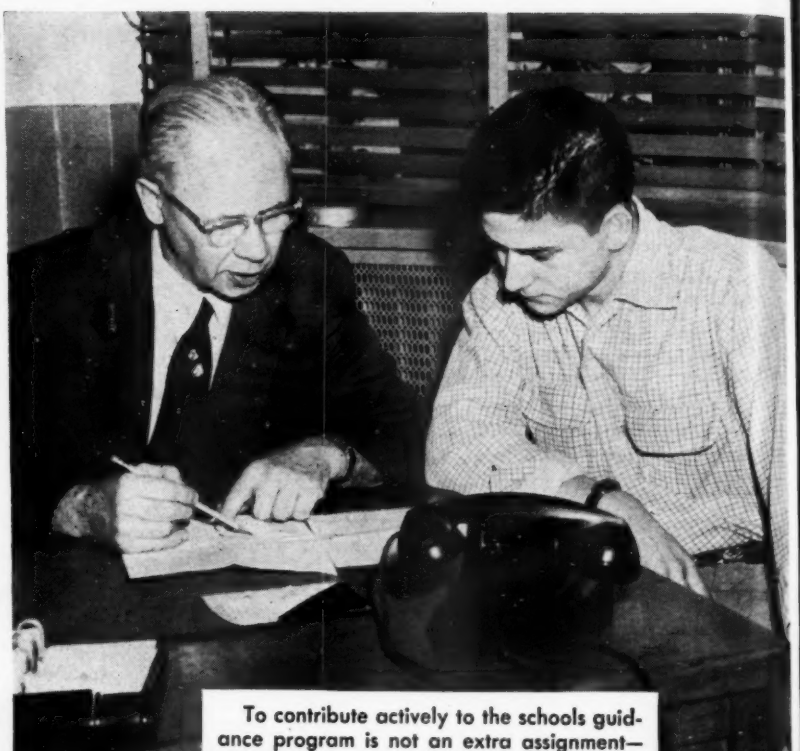
THE EXPERIENCE of working with tools, materials, and processes associated with and somewhat characteristic of industry should develop interest in the technical fields. Changes in course content will have to be made as part of this experience. For example, woodwork may well become more akin to wood technology and involve experimentation with materials bent and laminated rather than used in the solid form as at present. Other out-dated hand processes which are no longer employed will probably be dropped and replaced by those more typical of modern wood industries.

Perhaps the most significant guidance function that industrial arts teachers can perform is that of challenging and stimulating youth to express tentative vocational choices. Right or wrong, the fact that they express interests, ask questions, and seek counsel means that an important intersection has been reached. Until pupils make the initial inquiry, teacher questions may appear to be an invasion of thinking and have the opposite effect to the one desired.

When a pupil makes a tentative choice of occupation or vocation, he tends to set the pattern around which he will build his future. He alone must make the final choice for he must live with it. But, having reached a decision, teachers and counselors can help him undertake self-appraisal and constant re-appraisal in light of his objectives.

THERE ARE MANY WAYS in which a teacher may utilize available guidance services. Because the school counselor has no responsibility for discipline, the teacher will not refer to him pupils needing this type of advice. If the pupil's problems call for assistance beyond the teacher's capabilities, it would be wise to refer the pupil back to those skilled in guidance techniques.

Since many schools maintain cumulative record systems, every teacher should refer to them and make regular entries for all his pupils. In most cases, these written reports should describe positive factors such as interests, strengths, fine qualities, appropriate attitudes, and behavior patterns. These materials are especially useful for guidance purposes since the service seeks to identify and build upon the better characteristics. Reports of negative characteristics provide little if any help to positive action in guidance.



To contribute actively to the schools guidance program is not an extra assignment—it is a basic responsibility of working with youth—

Competent teachers will remember that all entries in cumulative records are confidential and not to be discussed except with other professional personnel. When case conferences are held, the same admonition holds. If confidential materials are divulged, the entire structure of guidance services would be seriously endangered.

No amount of experience provides a teacher or counselor with sufficient knowledge about more than a relatively few professions or vocations. The *Dictionary of Occupational Titles* lists nearly 40,000 separate and distinct entries.

However, the amount of free and inexpensive materials for reference purposes is literally overwhelming. Such publications as Forrester's *Occupational Pamphlets* and the *Occupational Outlook Handbook* furnish extensive lists of sources of these materials. The *Guidance Index* and *Occupational Index* are excellent sources of sound occupational information.

All teachers should use the two indexes of free material in order to accumulate a department library of resources for casual or intensive study by pupils. Much of the free material is of high quality and worthy of a permanent place on the guidance reference shelf.

AS THE INDUSTRIAL ARTS teacher learns to understand, contribute to, and make use of the services of the school guidance program, it is highly probably that he will have more favorable relationship with the faculty, administrative officers and, especially, the guidance staff.

After the industrial arts teacher develops a guidance point of view, the administration and guidance personnel may take time to learn more about the industrial arts program, its needs, purposes, and values for the academically talented, the slow learner, the physically handicapped pupil, and others.

In general, a greater respect for the abilities and worth of the industrial arts teacher as a contributing staff

member will be realized. Recognize the challenge, and the *opportunity*, in the decade ahead.

Neither teacher nor counselor can provide the service alone however, because the need does not end with a single interview, the ringing of the passing bell, or the close of the school day. Guidance consists of an evolving, growing, developing kind of process. There is no magic time, place, or date when a pupil makes a wise and final decision. For most, a decision made too early may not allow an appropriate assessment of potential abilities.

EFFECTIVE PARTICIPATION by teachers necessitates a clear understanding of the principles, practices, and functions of guidance. When possible, these are best obtained through graduate courses organized for these specific purposes although there are other opportunities. Most counselors welcome sincere inquiries as to cooperative endeavors or they will make provision for in-service orientation to guidance services. Recent federal legislation provides strong encouragement for other qualified personnel who anticipate preparation in guidance.

When the classroom teacher has a clear appreciation and understanding of guidance procedures, he may offer to serve as a part-time counselor to selected groups of pupils. While some may argue against this, there appears to be a marked tendency among counselors to concentrate attention on the upper 15 or 20 per cent (the academically talented pupils) and devote a rapidly decreasing amount of attention to the other students.

We do not argue that pupils with the necessary ability and interest for academic pursuits should be denied the encouragement and opportunity to continue on into college; the facts are however, some of them prefer to prepare in other ways. They must not be pressured into making decisions which will later cause dissatisfaction and frustration. There are many occupations outside the professions which require high ability and intensive preparation of other kinds.

When a pupil has college as an objective, patterns of high school course work are fairly well stabilized by college admission requirements.

However, under almost any other objective, the need for continuing guidance persists. All decisions must have regular and periodic review. As the pupil progresses toward identified goals, the need for continuing interest and further guidance goes on.

In the present frenzied atmosphere when there is much careless talk and action about intensive study of mathematics, science, and language for everyone, it is possible to lose sight of the individual pupil. This must not happen.

PUPILS MUST be guided to make wise choices for themselves. They must learn how to set tentative vocational goals which they can strive toward and attain. At the same time they must be helped to choose curricula and courses in line with their interests, abilities, and goals.

Perhaps this kind of service might well be undertaken by an industrial arts teacher who serves as a part-time counselor or homeroom teacher. In the latter assignment, he has fine opportunities to know his advisees well. As a result, he may offer wise counsel in educational, vocational, and personal matters.

Orientation programs which introduce new pupils to the school program of studies, services, and special features provide another opportunity for the classroom teacher to help. Every orientation session should have an industrial arts representative to outline and explain the options and choices available in this area. Some teachers visit schools from which pupils are to come for the purpose of providing orientation—others hold open house for them prior to the time of registration. These are helpful techniques, well worth intensive effort.

Similarly, industrial arts teachers may handle specific courses in careers and occupations where their greater knowledge of a variety of vocations permits them to add depth which would be otherwise unobtainable.

SCARCELY ANY SCHOOL system, to our knowledge, devotes sufficient attention to the placement and follow-up aspect of the guidance program. This is especially important to those pupils who do not go on to college. This kind of continuing interest in youth is perhaps as important as any one single service. The industrial arts teacher can make a most significant contribution to this aspect of the program.

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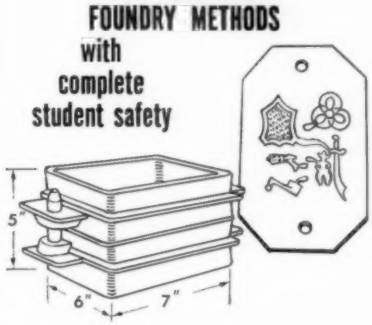

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Forney Arc Welders, Inc.
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Harnischfeger Corp.
2614 Nicollet Ave., Minneapolis 8, Minn.
Linde Air Products Co.
(Union Carbide & Carborundum Co.)
30 E. 42nd St., New York 17, N. Y.
Marquette Manufacturing Co., Inc.
307 East Hennepin Ave.
Minneapolis 14, Minn.

WELDING EQUIPMENT, OXYACETYLENE
Air Reduction Sales Co.
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Brodhead Garrett Co.
4560 E. 71st St., Cleveland 5, Ohio
Dockson Corp.
3839 Wabash Ave., Detroit 8, Mich.
Lincoln Electric Co.
22801 St. Clair St., Cleveland 17, Ohio
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Boice-Crane Co.
930 W. Central Ave., Toledo 6, Ohio
The Bowlathe Co.
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Brodhead Garrett Co.
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Delta Power Tool Division
Rockwell Manufacturing Co.
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Pittsburgh 8, Pa.
DeWalt, Inc.
Fountain Ave., Lancaster, Pa.
Duro Metal Products Co.
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Greaves Machine Tool Co.
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Greenlee Tool Co.
2136-12th St., Rockford, Ill.
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Oliver Machinery Co.
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Cooperative Planning in an Advanced Homemaking Education Class, Mary Jane Grieve, $1.00. Thesis title: "Developing a Student Teacher Cooperatively Planned Program for Advanced Homemaking"

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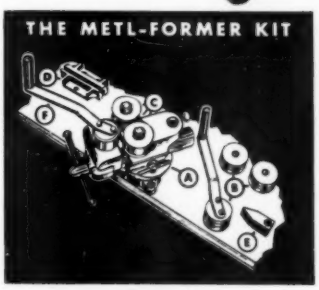

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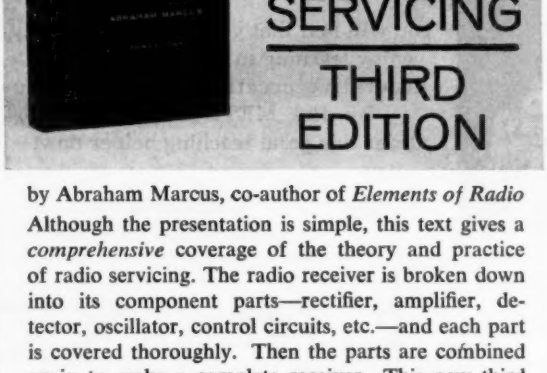

by Abraham Marcus, co-author of *Elements of Radio*

Although the presentation is simple, this text gives a *comprehensive* coverage of the theory and practice of radio servicing. The radio receiver is broken down into its component parts—rectifier, amplifier, detector, oscillator, control circuits, etc.—and each part is covered thoroughly. Then the parts are combined again to make a complete receiver. This new third edition contains the latest information on semiconductors, transistor radios, AM-FM receivers, hybrid automobile receivers, three-way portable receivers, printed circuits, and high-fidelity amplifiers and receivers. For more information, write:

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'SCHOOLS FOR SAFETY' PROGRAM ACCELERATED

The 1960 President's Conference on Occupational Safety, for the first time, devoted a major segment of the program to discussions centered on outcomes of the Office of Education's Conference on the School's Contribution to Occupational Safety through Shop Safety Programs. Secretary of Labor James P. Mitchell issued a challenge to schools in his opening address:

"FOR THIS CONFERENCE, one aspect of that challenge is especially compelling. In the decade ahead, there will be a surging increase in the number of young and inexperienced workers, just as we experience a shortage of men in their working prime, the group between 35 and 44 years of age to which we ordinarily look for the highest experienced skill, supervision and leadership. The proportion of older workers and working women will also rise sharply.

"Measured against this trend in the labor force toward job growth in occupations requiring the highest skills and the greatest amount of education and training.

"The evolutionary changes explicit in the first challenge to this Conference illuminate the nature of the second challenge:

"New discoveries will increase the demand for scientists to teach and research in fields like electronics, nuclear energy, medical research, and space exploration. Mathematicians, physicists, biologists, and chemists will be in demand. So will technicians, programmers for computers, medical personnel, skilled building craftsmen, skilled maintenance men, teachers, tool and die makers, and clerical personnel adept at handling automatic instruments.

"The dilemma, then, is how to meet the increasing demands—indicated by the sketch of demand occupations I just gave—for highly skilled personnel from a growing supply of less experienced workers.

"Certainly we must improve educational facilities and opportunities. We must increase individual competence across the board. We must make a wise and just use of our manpower without regard to race, sex, age or physical handicap.

"And we must make certain that the waste of accident and work death is eliminated.

"The only formal safety instruction that millions of our new young workers will receive before they go on the job is that given to them as a part of their education.

"Safety should be a conscious effort in education from the earliest years."

An earlier statement by Secretary of Labor Mitchell during the 1958 President's Conference on Occupational Safety served as a stimulant for the Office of Education Conference. Commissioner Derthick in opening the plenary session referred to that earlier challenge which pointed out the seriousness of the challenge in the light of our school population. Secretary Mitchell had said:

"But what of the future? Unless we improve on the past we can expect about a quarter of a million more disabling injuries in 1965 than were suffered in 1957. Like Alice in Wonderland, we must run

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to stay in the same place. To win the race against accidents we must run faster and faster . . .

"Despite all of our progress, we can today promise only a fifth of our young people an accident-free working life. And this is assuming we can maintain our present levels of accomplishment.

"Maintaining such levels will not be easy with a changing labor force in a changing technology, a technology characterized by both speed and speed of change."

What greater challenge could face educators as they look to the future and consider the Nation's manpower requirement. Just as eternal vigilance is the price of liberty, so is unremitting study and action the price of safety. In the face of significant gains made by American industry, labor, and the States in improving working conditions and work practices, accident losses continue to be a problem of major magnitude. These losses are preventable; no accident is inevitable, yet in 1958 some 1,820,000 workers were disabled and 13,300 deaths occurred on the job.

THE OVERALL objectives of the President's Conference on Occupational Safety were:

"(1) to focus National attention on the importance of occupational safety and the continuing need to do something about it,

(2) to identify and emphasize emerging problems in occupational safety, foreshadowed by unprecedented extension and changes in the size and composition of the Nation's work forces, and by the impact of explosive technological advances in American industry, and.

(3) to obtain a broad consensus of views and to formulate recommendations on matters requiring consideration of or action by appropriate groups concerned with job safety."

U. S. Commissioner of Education Dr. Lawrence G. Derthick, in his opening remarks accepted Secretary Mitchell's challenge in behalf of the schools and offered a progress report of the Office of Education National Conference on the School's Contribution to Occupational Safety through Shop Safety Programs held in Washington in 1959.

Speaking from the educator's point of view, Dr. Lyle Ashby, Deputy Executive Secretary of the NEA, emphasized that education proceeds on the theory that safety is a quality or characteristic of whatever human beings do, rather than an entity distinct within itself. Safety is involved in any function or activity of life—on the job, at home, on the playground, on the street or highway, at school. Safety is our own concern wherever we happen to be or whatever we happen to be doing. It is indigenous to the structures and facilities we build.

FROM THE INDUSTRY point of view, it was pointed out that the 1959 National Conference held by the Office of Education performed a monumental service by establishing the bench marks and signposts for action. Industry has a vital and compelling interest in safety in schools and colleges and supports the recommendations made. Industry would like the schools and colleges to provide graduates who:

- Have good attitudes toward safety derived from actual training in and practice of safe living in their school and other activities.
- Know and appreciate that safety will be required of them when they take a job in industry in just the same way as they are expected to be proficient in the other skills they learned in school.
- Have a record of good, safe, accident-free performance in all school work and activities, including vocational and shop work.
- Have had teachers whose sincere interest in and knowledge of safety have caused them to integrate it into all phases of student work and activities.
- Have learned self-discipline and have been taught to understand and live with authority.

SAFE LIVING and safety education in the schools consciously taught and practiced will provide the natural bridge to safety on the job and even more important, to good safety attitudes. In fact, safety should be just as important a school requirement as proficiency in arithmetic, typing or the shop and vocational skills. Unless it is achieved, industry will continue to be doomed to making up for this lack and chances of lowering the high accident-frequency rates of new employees just out of school will be much poorer.

Panelists, representing management, labor, safety engineering, and education groups, and the audience were in support of the proposals adopted at the 1959 USOE conference.

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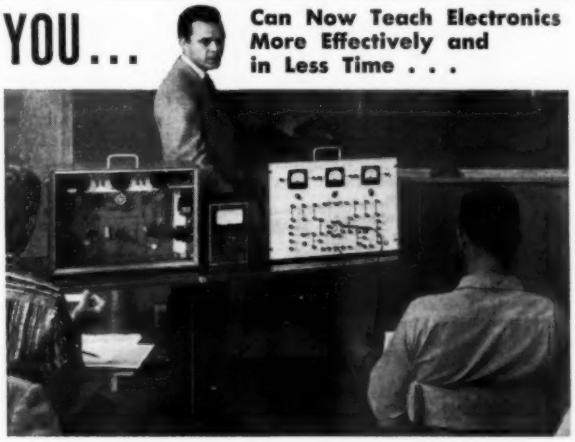

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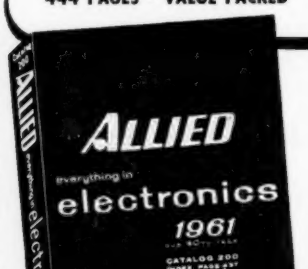

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What's the Right Word?

(from page 17)

• *Check your personal library and shelf of books in your shop.* Every shop, drafting room, or industrial arts classroom should have a dictionary, special technical dictionaries, and pertinent handbooks or reference books. Keep some of these books at home so you can use them easily yourself. Get acquainted with their indexes and tables of contents. Make notes in your copies so they become more meaningful and helpful to you. Subscribe to at least one or two technical or trade magzines so you can keep up-to-date with the new words and concepts in your field. These magazines can be quickly scanned for those articles of greatest interest to you. Your students should have access to these magazines.

• *Work with your school librarian* to develop and build the technical reference section. She will welcome your help and advice. You may be better acquainted than she with the technical books she should place on her shelves. You can guide her in the selection of technical magazines for your students. She will help you and your students keep up with the flood of technical words.

• *Remember: You can't learn all the new words, and you can't teach them all.* You *can* use them as you need them. You *can* teach your students to look with suspicion on any new term they don't understand. A new word in a textbook or magazine article should be like a red flag before a bull. It is no sin for your students to admit they don't know a new word; it *is* a sin if they don't look it up. This is an attitude you can teach and emphasize. Words that occur often should be used often. Students will learn new words as they use and need them. Ask your students to check the words on their project planning sheets, and test the students to make sure they understand the words.

Students can adopt the right approach and attitude, and build a vocabulary "map," or "realm," that is interesting and meaningful to them. Their "maps" may change when they leave school; their needs will be different; they may work with new or different technical subjects—but with the right attitude they won't be afraid of new technical words.

• *Technical vocabulary is not taught in English or Social Studies.* General science presents many technical concepts; chemistry and physics cover more—but the latter courses are limited pretty much to college preparatory students. Many students never take chemistry or physics. The industrial arts teacher has the biggest chance to teach (to most of the students) an appreciation of technical vocabulary and the use of technical words. This can be done much better in the industrial arts shop, in the industrial arts frame of reference. Chemists or physicists develop a process or a product in the laboratory; engineers must build the plant to manufacture it and put the process to work. In the industrial arts shop, the students can develop vocabulary in the field of their own special interest. He can develop an understanding of technical words at the time when he sees the most need for them. As he uses the words in their more meaningful context, he will reinforce his learning.

• *Technical vocabulary is precise and detailed.* These features are both a blessing and a curse. Technical words are usually concrete. Often they have one and only one meaning. The speaker or writer must understand the meaning to use the word correctly—so that the reader gets his message. Because of this limitation—one meaning—we need many different words to communicate technically with one another. People or students who lack the aptitude to think about details (or who are too lazy!), or who prefer to think in abstract generalizations, may have trouble with technical vocabulary. Learning and using technical words requires patient, careful work.

• *Each student may have a different linguistic background or heritage.* Teachers are well aware of these differences. The girl whose father works in a metal manufacturing plant hears a different pattern of speech at home than the boy whose dad keeps the books at the electric light company. Some companies' employees have a jargon all their own. (An interesting assignment might be to have each student list the technical words he hears at home and present the list to the class.) It is important for teachers to recognize the differences in technical vocabulary, the varying competencies of students in different grades, and the need for building the proper vocabulary skills.

• *Teachers can extend technical vocabulary building and study beyond the industrial arts shop.* In a fairly recent survey (1958) it was discovered that an increasing number of industrial arts teachers assign homework. In some fields as many as 48 percent of the industrial arts teachers assign some kind of reading outside the shop or classroom. Some assign reading in the library, other teachers require reports or papers, which in a few cases are corrected by the English teacher as well. You can give students study assignments in a good industrial arts textbook before they start building their projects. Students can save valuable shop time if they first read about the tools, processes and materials they will use. Safety rules have their own special importance. Technical vocabulary can be treated in such assignments—and tested in short five-minute quizzes in school. If the student learns to tackle the problem on his own, he will have made a big step forward.

• *In the final analysis, students learn* the correct use and meaning of technical vocabulary as they need technical words, and as they speak or write them (letter them in the drafting room!). Don't let your students down! Insist on their understanding the words, and using them correctly.

Industrial arts teachers have a challenge and an opportunity in teaching technical vocabulary. Let's make the most of it.

associations and People

THREE STATE DIRECTORS NEWLY APPOINTED

J. Warren Smith

George Martin

Dr. Gerald B. James, member of the teacher training staff at North Carolina State College for the past eight years has been named to succeed **Dr. J. Warren Smith** as North Carolina State Director of Vocational Education.

Dr. Smith, who officially retired in June, fulfilled 12 years as State Director. He served as Chairman of AVA's first Awards Committee and made numerous contributions to vocational education at the national as well as the state level.

—AVA—

Maurice Varney, of Maine, has been succeeded by John Snell (former State Supervisor of Agricultural Education) as State Director of Vocational Education.

In Georgia, **George Martin,** who replaced Dr. M. D. Mobley as State Director of Vocational Education in 1951, retired. He is succeeded by Jack Nix, who is the former Georgia State Director of Certification.

—AVA—

Thomas D. Bailey, Florida State Superintendent of Public Instruction was presented with a "distinctive and meritorious leadership award" by the local directors of vocational and adult education in his state at their fifth annual conference in Tallahassee May 12.

—AVA—

Walter C. Brown, former Associate Professor, Industrial Education, University of Missouri, is the newly appointed Director of Vocational-Technical Education and Supervisor of Industrial Arts, Phoenix, Arizona.

—AVA—

Donald E. Jesseman, educational sales representative for Stanley Tools, division of The Stanley Works, New Britain, Conn., was recently initiated into Epsilon Pi Tau, international honorary professional fraternity in industrial arts and vocational education at the Zeta Chapter, Northern Illinois University.

—AVA—

This year, the twenty-fifth annual convention of the **Puerto Rico Chapter of the AVA,** was a significant affair. The celebration was dedicated to the past presidents of the association, who had geared their efforts to the promotion and developments of a strong association and the professional growth and economic well-being of its members.

The first president of the association (in 1934) Antonio Texidor, was present at the convention and so were 18 other past presidents. Awards were granted to them in the form of honor certificates to honor their services during their terms of office. Mr. Texidor addressed the audience and expressed the satisfaction of the group of past presidents for the honor which had been conferred on them.

Addresses were also delivered by Mrs. Isabel Walker de Martínez, President of the association, Dr. Efraín Sánchez Hidalgo, Secretary of Education, and Juan López López, Convention Chairman. The guest speaker was Fernando Sierra Berdecía, Secretary of Labor. Sierra Berdecía spoke on *Contribution of Vocational Education to the Industrial Development of Puerto Rico.*

During the banquet luncheon, the anniversary cake was cut jointly by Mr. Texidor, first president; Mrs. Martínez, the 1959 president; Mrs. Felícita Reyes de Médez, the new president for 1960 and Mr. López López, President elect for the year 1961.

Songs, musical numbers, and colorful ballet dances were also presented as a special feature during the banquet luncheon.

The new AVA officers for 1960 were elected at the business meeting of the convention. The new president, Mrs. Méndez, will continue to work together with the hundreds of vocational and industrial arts teachers, supervisors, administrators, and lay people who belong to the association, for the success of the AVA in Puerto Rico.

—AVA—

More than 700 vocational educators from schools all over Georgia assembled in Atlanta June 9-10 for the 13th annual conference of the Georgia Vocational Association at the Biltmore Hotel.

Highlights were addresses by two internationally known educators, Dr. Willard E. Goslin, Professor Educational Administration at Peabody College, Nashville, and Dr. H. H. London, Past President of the AVA and Professor of Industrial Education, University of Missouri.

—AVA—

Charles F. Green has been appointed Director of Vocational and Technical Education, Warren County, N. J. He is the former evening school principal, Middlesex County Vocational and Technical High School, New Brunswick, N. J.

—AVA—

J. E. Hollingsworth, Dean, Long Beach City College, Business and Technology Division, Long Beach, Calif., since 1960 has retired to pursue personal business interests, to study post high school education and to engage in part-time consulting services.

Samuel W. Caplan, who recently retired after 14 years from his position as Chief, Distributive Education Department of Public Instruction, Commonwealth of Pennsylvania, was honored at a testimonial dinner last spring. During his tenure as Chief, Mr. Caplan established an adult distributive education program in which over 40,000 persons participated. Under his guidance the number of distributive education cooperative high school programs increased from 42 to 54 schools.

He is presently Director, Distributive Education Department, Teachers College, Temple University, Philadelphia, Pennsylvania.

—AVA—

Alton Ice of Austin assumed the office of Executive Secretary, Vocational Agriculture Teachers Association of Texas September 1 when John Holcomb joined the faculty at A & M College. Mr. Alton has been Texas Supervisor of Vocational Agriculture for Area 7 since 1958.

—AVA—

C. R. Crakes, Educational Consultant, DeVry Technical Institute, addressed the Trade and Industrial group on *The Challenge of the Electronic Age* at the Alabama Vocational Association Convention March 17. He was also a guest speaker at the Mississippi Vocational Association meeting, March 25, and in Nashville, Tenn., April 8 he spoke to industrial arts and trade and industrial educators.

—AVA—

Fred J. Gross, manager, educational sales of Stanley Tools, New Britain, Conn., completed 50 years of continuous service with the hand tool division on June 30 and retired at that time.

Well-known from coast-to-coast for his contributions to the upgrading of school shops and their facilities, he is a pioneer in the field of school relations for industrial firms serving the schools. Through his efforts a number of teaching devices were developed which are distributed to shop instructors by Stanley Tools.

DIED. . . . .

Herman F. Hinton, AVA Life Member and former Florida State Director of Vocational Education, on March 24.

Dr. William D. Bawden, whose career in vocational education spanned 55 years, in Santa Barbara, Calif., April 27. He was Professor and Head, Industrial and Vocational Education, Kansas State Teachers College from 1925-1951.

Dr. Raymond W. Heim, Delaware State Director of Vocational Education from 1919-1960 and a member of the original, historic Federal Board for Vocational Education (1917) in Newark, Delaware, in May.

L. S. Hawkins of Warwick, N. Y., the remaining living member of the original Federal Board for Vocational Education, July 29. Entering the field as a lecturer in 1904, his distinguished career included service as Director, Vocational Training for Defense Workers, 1941-45; and Chief, Trade and Industrial Education, USOE, 1939-47.

Mrs. Ruth Jones, Colorado State Supervisor of Practical Nurse Training since 1957 in Denver, July 17.

New Books

A Career for You in Direct Selling. National Association of Direct Selling Companies, Winona, Minn., 1960. 16 pages, free to distributive education coordinators.

Here are the stories of a number of men and women who have found successful careers in direct selling.

* * *

Fruit Growing, by G. W. Schneider and C. C. Scarborough. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1960. 307 pages, $5.20.

This new work presents an over-all picture of what is involved in the successful production of fruit. Part One considers factors that affect plant growth and fruit development. The second part covers basic problems involved in producing each major fruit crop.

* * *

You and Your Career, prepared under the supervision of the Editors of Collier's Encyclopedia. P. F. Collier & Son Corporation, 640 Fifth Ave., New York 19, N. Y., 1960. 50 cents.

Here 113 careers are analyzed. Job descriptions; employment trends; qualifications; preparation and entrance requirements; chances for advancement; earnings; and competition in the field are covered in each case.

* * *

Business Correspondence for Colleges, by Marjorie Hunsinger. Gregg Publishing Division, McGraw-Hill Book Co., 330 W. 42nd St., New York 36, New York, 1960. 259 pages.

A text-workbook for anyone interested in writing better business letters, this book is primarily designed for use as a classroom text.

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Leadership for Action in Rural Communities, by B. W. Kreitlow, E. W. Alton, and A. P. Torrence. The Interstate Printers and Publishers, Danville, Ill., 1960. 346 pages, $5.00.

The information and the help needed by any person or group involved in or interested in or being trained for leadership positions in rural communities is presented here.

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Understanding Radio, by Herbert M. Watson, Herbert E. Welsh, and George S. Eby. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y., 1960. 706 pages, $6.20.

A guide to practical operation and theory, this third edition offers new emphasis on visual teaching. Several new circuits, tubes, applications and principles have also been introduced.

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Mechanics, by John W. Brenneman. McGraw-Hill Book Company, 330 W. 42nd St., New York 36, N. Y., 1960. 262 pages, $5.50.

This book is written for the person who wishes to further his knowledge of engineering fundamentals. It has been thoroughly tested in the fields of industrial training and in correspondence instruction.

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Aerospace Dictionary, by Frank Gaynor. Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y., 1960. 260 pages, $6.00.

An up-to-the-minute reference work of essential terminology in space exploration, this volume is designed to meet the specialized requirements of industry and government as well as the needs of students.

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Architectural Drafting, by William J. Hornung. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1960. 230 pages, $5.50.

Here, the principles of architectural drafting are taught through a variety of construction jobs such as drawing house plans, designing a heating system, laying out the plumbing and specifying the electrical equipment.

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Business Dictionary, by Louis C. Nanassy & William Selden. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1960. 263 pages, $2.96.

Co-authored by AMERICAN VOCATIONAL JOURNAL Editor Dr. William Selden, this practical reference book has been prepared in response to manifested need for a simple, up-to-date, alphabetical list of business and economic terms, with definitions.

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A Structure of Science, by Joseph H. Simons. Philosophical Library, 15 E. 40th St., New York 16, N. Y., 1960. 269 pages, $4.75.

The author's primary objective in writing this book was to resolve for his own satisfaction some of the conflicting consequences of the extrapolation of scientific facts and theories to the universe itself.

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Energies of the Universe, by Eugene Fritz. Philosophical Library, 15 E. 40th St., New York 16, N. Y., 1960. 124 pages, $4.75.

In this popularized account of natural phenomena as understood by modern science, a host of facts and figures support the view that the education of today's scientists is in many instances based on misconceptions.

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College Arithmetic, by I. W. Layton. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1960. 200 pages.

Intended primarily for students entering college without the mathematical understanding and skills necessary for adequate handling of problems that arise in everyday affairs, this book may also be used in adult programs of education.

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The Way Up, by Laura Kuhnel Chaney. Vantage Press, Inc., 120 W. 31st St., New York 1, N. Y., 1960. 239 pages, $3.95.

Here is a complete and sympathetic text on living at the office and outside.

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Mechanics, by John W. Breneman. McGraw-Hill Book Company, 330 W. 42nd St., New York 36, N. Y., 1960. 262 pages, $5.50.

Third edition of this text is written for the person who wishes to further his knowledge of engineering fundamentals. It incorporates the study of simple machines, gears, gear trains, pulleys and mechanisms and enables readers with a limited mathematical background to analyze force systems and deal properly with particle knematics and kinetics.

Industrial Electricity, Vol. II, by Chester L. Dawes. McGraw-Hill Book Company, 330 W. 42nd St., New York 36, N. Y., 1960. 573 pages, $7.50.

This two-volume work presents basic principles and applications of alternating currents as related to electric measurements, machinery, power transmission, electronics, and rectifiers. The relation of the several types of power machinery to their industrial applications is discussed in detail. A wealth of new material has been added, altered and augmented in the light of new technological developments which require that instruction be carried to a higher level.

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Handbook for the Medical Secretary, by Miriam Bredow. McGraw-Hill Book Company, 330 W. 42nd St., New York 36, N. Y., 1959. 378 pages, $1.50.

This handbook deals with the specific problems that the medical secretary will encounter, without attempting to duplicate material found in general secretarial books. Banking practices, duties of a dental secretary, medical vocabulary drills, reference reading and a new glossary with shorthand outlines are important features.

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So You Want to be a Scientist, by Alan E. Nourse. Harper Brothers, 49 E. 33rd St., New York 16, N. Y., 1960. 182 pages, $3.00. Prepared for young people who want to become scientists and those who have not fully decided on making their careers in a scientific field this book goes into detail in the various fields of science.

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The Story of Chemistry, by George Lockemann. Philosophical Library, Inc., 15 East 40th Street, New York 16, N. Y., 1959. 277 pages, $4.75.

Mr. Lockemann, one of Germany's leading organic chemists, has brought the history of chemistry up-to-date with the latest discoveries of nuclear chemistry, on the borderline with nuclear physics. New light is thrown upon early chemistry in Egypt and its beginnings in Greece as well as upon Arabic chemistry.

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Handbook of Adult Education in the United States, by Malcolm S. Knowles. Adult Education Association of the U.S.A., 743 N. Wabash Avenue, Chicago 11, Illinois, 1960. 640 pages, $7.50.

This comprehensive handbook describes what adult education is as well as how it came about, why a new curriculum for adults is being developed and where adult education is going. It contains authoritative facts, useful suggestions, and stimulating ideas.

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Analytic Geometry, by John W. Cell. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1960, 300 pages, $4.95.

This third edition is a major revision of the original with strong emphasis on finding equations through the use of the locus derivation method. Traditional formulas have been omitted where problems can be solved as efficiently by graphical analysis. Special problems are provided for superior students, and each chapter ends with a review outline which suggests improved methods of study.